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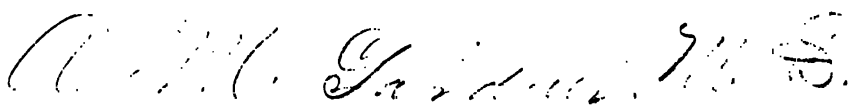

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LECTURES

ON

SOME IMPORTANT POINTS

CONNECTED WITH THE

SURGERY OF THE URINARY ORGANS

DELIVERED IN THE

Royal College of Surgeons, London

BY

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ETC.

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PREFACE.

THE Six Lectures given at the Royal College of Surgeons in June 1884 appear in print for the first time in a complete form, the original text being almost unaltered. Condensed reports with large abstracts have already appeared in the leading medical journals, but a considerable portion of each lecture was necessarily omitted for want of space. The tables and reports of cases now supplied form also important additions, besides foot-notes, references and authorities in abundance.

The cheap Students' form which I originally designed for my other works has been again adopted, in the belief that it is the most acceptable to the medical public, while it also best fulfils the intention of the author.

October 1, 1884.

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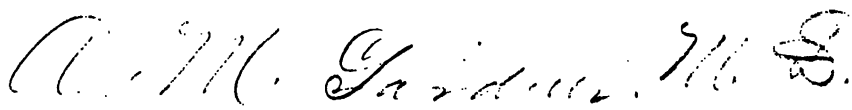


IMPORTANT POINTS CONNECTED WITH THE

SURGERY

OF

THE URINARY ORGANS

I propose to devote this lecture only to the first-named subject, viz. to some important considerations in relation to the treatment of stricture of the urethra, since it is one which will make a smaller demand upon our time than any of the others.

I shall commence by endeavouring briefly to review the progress which practice has manifested in regard of treatment during a period embracing the last sixty or seventy years; the lapse of time enabling us now to review the subject more intelligently and impartially than contemporary observers are generally able to do. And I think we shall see that the most obvious and the most serious defect which characterised during that period and previously the surgical treatment of urethral obstructions of all kinds, was the superfluous use of mechanical agents, and the unnecessary application of potent escharotics; while the instrumentation employed for all purposes was generally needlessly harsh and severe. In illustration of the first remark, it is barely necessary to recall the advocacy by one who possessed a name always famous here—I mean Sir Everard Home—of the so-called cure of stricture by dilatation. In support of this method he recorded several examples which he regarded, to use his own words, as 'highly creditable to the mode of treatment;' one of which required 'eight years,' and another 'nine years for its cure.'[1] And in relation to the application of caustic, in which he followed the method of Hunter, among numerous cases referred to there is one of which he gives a history, comprising the application of the agent no less than 1,258 times during fifteen years; in the first and second of which years he employed it 233 times. It is needless to say that Sir E. Home's example exerted considerable influence on his successors, and that the application of caustic in one form or other became a favourite mode of treatment with many. Indeed, both here and abroad, a combination of some chemical agent, nitrate of silver or caustic potash, with the mechanical one, was for a long period much in vogue. Witness the works of Arnott, Ducamp, Amussat, Whately, B. Phillips, and others. Sir B. Brodie, however, from the first discouraged the practice, and ultimately opposed it on account of the serious evils he had seen produced thereby.

With regard to the manner of making dilatation in the earlier part of the century, the agents most commonly employed were

[1] *Surgical Observations*, vol. iii. chap. x.

perhaps the wax and plaister bougies, which were gradually in part superseded by metallic bougies or dilators (both cylindrical and conical), and also by silver catheters in this country, when dealing with strictures admitted to be permeable by instruments, the elastic English gum catheter and bougie being also much used by some. When any of these instruments, which were not then so small or so delicately constructed as at present, failed to penetrate the stricture, a wax bougie, armed with caustic potash, or with nitrate of silver, was carried down to the obstruction and pressed against it, a proceeding which was usually repeated in each case many times. Few things are more startling, in comparing modern practice with that of our fathers and grandfathers, than the very large amount of time and labour which was expended by them on a case of stricture, and accepted by the patient, as contrasted with that which is found necessary at the present day. A patient with stricture was mostly under treatment for several months, often indeed, as we have just seen, a patient for life. He rarely used an instrument for himself, but relied on his surgeon, whose visits became increasingly frequent as in the lapse of years the rigidity of the obstructing tissues increased. The object of both was avowedly to avoid any cutting operation, at almost any hazard, and the only other resource, except in very rare instances, the bougie having become obviously incompetent, was the use of nitrate of silver and of caustic potash. And there is reason to believe, although great suffering and unnecessary irritation followed this practice, that now and then, partly by good chance, and partly by some skill, a stricture was much relieved by the potash application. These clumsy, uncertain, and prolix methods, however, were adopted in consequence of an almost universal and unreasoning dread of any form of internal urethrotomy, associated with extreme reluctance to adopt the more serious procedure by external or perineal incision. If, however, after months or years of disappointed efforts to pass any instrument through the stricture—and it is extraordinary how long this futile task of passing a bougie as far as to the stricture and no farther, was recognised by both surgeon and patient as valuable or necessary treatment—the urethra was declared hopelessly impermeable, and if the patient's sufferings were severe, he might then be submitted to 'perineal section.' This being decided on, he was placed in the lithotomy position,

the urethra opened on a staff in front of the stricture, and an attempt, by no means always successful, was made to dissect through the narrowed passage to the urethra beyond. Professor Syme, of Edinburgh, however, rendered lasting service at this time, by declaring 'impermeable stricture' to be a contradiction in terms; asserting as a general rule, to which the surgeon should rarely be driven to admit an exception, that if urine could find its way outwards, he ought by care and perseverance to insinuate a small instrument of some kind, sooner or later, and arrive at the bladder, so as to avoid the caustic on the one hand, and the division of parts in the perineum without a guide on the other. Hence his primary object in dealing with the worst forms of the disease, was to carry a slender grooved metal staff (No. 1 or 2) into the bladder, and to divide the stricture upon it by incision from the perineum, insisting that, without free division of the morbid tissue in such cases, a tolerable cure was impossible —an operation which he performed between two and three hundred times.

But, meantime, French surgeons, it must be admitted, had been somewhat in advance of us, in their views and practice in relation to urethral stricture. They sedulously avoided on principle rigid instruments, as liable to provoke painful, if not dangerous, complication of the existing disease; and they adopted the most flexible bougies and catheters, made in various forms and of various materials, in smaller sizes, and arranged with finer gradations of magnitude in the ascending scale, than those which were employed in this country. These they endeavoured by patience and gentleness to insinuate fairly through the narrowed channel, and laboured to avoid the production of false passages; often then so recklessly made by our silver catheters. And they had also arrived at the conclusion that simple dilatation, effective as it is against contractions of recent date, is useless, or at best only temporarily palliative in its influence, on many old-standing and confirmed examples of the complaint. Hence their early resort to internal urethrotomy, and their habitual employment of many ingeniously constructed urethrotomes, long before the practice was adopted in this country.

It is true that Physick, of Philadelphia, had adopted a simple lancet-pointed perforator at the end of the last century, and that Sir Charles Bell, in 1807, had improved the procedure; while Dr. McGhie, of Dumfries, proposed a modification in 1823; neverthe-

less the practice was not adopted here. But Mr. Stafford, in 1827, was the first to employ a practicable form of urethrotomy in this country, and he perfected during the next few years his method and his instruments so much that they became the types, from which were derived, by slight modifications, many other urethrotomes produced especially in Paris at and after this period. Nevertheless, Stafford's instruments were never popular in this country, and they served rather to excite prejudice against internal urethrotomy, by the facility with which it was obvious that they might seriously injure the urethra, at all events, in any other than very careful hands.

In reverting to the practice of the chief French surgeons who advocated the operation at this time (Amussat, 1824; Leroy, 1825; Tanchou, 1835; Ricord, 1838; Mercier, 1843; Civiale, 1849), it is now not difficult to observe what was the chief defect of the methods they practised. As pioneers, they proceeded with extreme caution, in the direction of internal incisions: the rivalry between the men just named being keen, mechanical modifications and improvements were constantly proposed; but above all things they sought to avoid any disastrous result, publicity of which, owing to the watchful oversight mutually maintained, would be ensured and might prove damaging to the operator. The defect of their practice consisted in their venturing only to make an imperfect division of the contractile tissue, constituting the essential elements of the stricture; and in employing urethrotomes which were not adapted to ensure a free incision. The fear of deeply incising the structures surrounding the urethra, and so occasioning free and dangerous hæmorrhage from the erectile tissue, as well as other evils, led to the use of small blades, and even to the making numerous slight scarifications of the urethra at the seat of the stricture, in place of what alone could render lasting service, viz. complete division of all the obstructing fibres. Temporary relief was thus afforded, but the narrowing very soon reappeared. Civiale, in later years, declared to myself his preference for what he called a 'scarification légère' in aid of dilatation; and was in the habit, while avowedly treating a patient by the latter method, to help the bougie at any time when the process proceeded slowly, by taking his urethrotome from his pocket and making a little incision, from which, perhaps, a drop or two of blood appeared, and then passing the bougie

with increased facility ; a process repeated several times perhaps in the course of the treatment.[1] For patients living in or near to Paris, and more or less under his eye, such cautious and safe management no doubt attained valuable results ; especially for advanced cases in which the operator desired to avoid a bolder course, and it saved him and them much anxiety. For patients who came from a long distance, and who after a month or two went away charmed with the extent of their relief, and the ease with which it had been effected, a severe disillusion was in store, and mostly soon arrived. Nevertheless such practice is not without its lessons, and is not to be lost sight of in its applicability to an occasional case now. The first among the French urethrotomists who really perceived the necessity for complete division, or at least was bold enough to avow and to act upon his belief, was Reybard, whose work gained for him the award, by the Imperial Académie of Medicine, of the Argenteuil prize in the year 1852. He repudiated cauterisation altogether as a means of treatment, and regarded dilatation as generally insufficient, preferring internal urethrotomy in the majority of cases. He employed a powerful urethrotome with a long blade, made considerable dilatation of the urethra first, so as to permit the introduction of a stout instrument flanked by two lateral rods, which were then to be separated by means of a screw in order to stretch the passage as much as possible. Lastly, the urethra being in this tense condition, the blade was applied, and the whole strictured portion unflinchingly divided throughout its whole extent, often involving an incision two inches or more in length, and half an inch or more in depth. His principle was undoubtedly a sound one ; but I think that his urethrotome was a dangerous instrument, since it was a purely mechanical one, and could not be influenced by the operator's intelligence. It was not possible to modify the incision, while making it, according to the amount or degree of the obstruction encountered ; a power which it is always essential, in my opinion, to possess while making any incision. Moreover, he appears to have been somewhat reckless in using it ; and soon meeting with some alarming hæmorrhage, and with consecutive abscesses, and partly from want of experience in the subsequent management of his cases, several died, and his method fell into

[1] In 1832 Amussat advocated 'scarification' as the best mode of dealing with obstinate stricture.

disrepute. Hence some reaction against the use of free incisions, and the subsequent popularity of Maisonneuve's safe, easily used, but less efficient urethrotome, and of the numerous modifications of it which have been adopted. A method differing little from that of Reybard was adopted a few years ago by Dr. Otis, of New York, who insists on the necessity for making an estimate of the size of the urethra from a surgical point of view, rather than from a physiological one; an estimate in regard of calibre larger than that which has been generally accepted. Long before Reybard's time, however, exaggerated estimates of what is not very happily called urethral calibre, have been advanced from time to time, for example by Boyer, and by Mayor of Lausanne, with what unfortunate results history has not failed to record.

For the purposes of surgical treatment we may properly entertain the view that the urethra is a very dilatable canal, and can bear the strain imposed on it by instruments of a very large size, when there is an adequate necessity for using them; but it is no less desirable to remember that the urethra is a very delicate and sensitive passage, never to be stretched beyond certain limits without incurring risks which are sometimes very grave. To what extent we may thus dilate with prudence, will be considered in treating of lithotrity. The question has been alluded to here, for the purpose, not of marking differences in practice, but of pointing out a growing concurrence in opinion among practised surgeons, that in dealing with stricture by operation, free incision of all the opposing structures must be adopted, or the result will be temporary only and disappointing. I have just alluded to Professor Syme's early enunciation of this principle, which he decided for himself could only be effectively realised in practice by an operation performed in the perinæum; a proceeding which met with great opposition here, and was the occasion of a very acrimonious discussion which some of us may remember. A cardinal defect in his method is now at this distance of time apparent. Recognising the truth I have been insisting upon, that the division of the stricture must be complete, he limited himself to the division of one stricture only, rarely being able to reach or deal with two from the perineal wound, if indeed he cared to recognise the existence of multiple stricture, which I doubt; or at all events doing so, he believed in the disappearance of other or minor contractions, after the principal stricture had

been freely divided. There is no warrant, however, for any such belief; it will not suffice for the purpose of affording substantial and fairly enduring relief to a patient, whose urethra is narrowed by strictures in two or three distinct situations, to divide, however freely, only the chief of these, and leave the rest untouched. To do so is certainly a grave error. So far from a secondary narrowing disappearing after what has sometimes been termed 'the master stricture' has been cut, it often happens at no distant period that the points formerly slightly affected seem to assert themselves more obstinately than before. I cannot, therefore, insist too strongly on the value of an axiom, which I will venture thus tersely to formulate: 'If you cut at all, cut all;' that is, all the points in the urethra at which the presence of obstructing deposit is to be demonstrated, and all the obstructing tissue at each point. Such is the unhesitating conviction which a very considerable experience of internal urethrotomy has forced upon me. In the year 1854 I published the Jacksonian essay referred to, and after much personal intercourse and study with Professor Syme, I adopted his view in relation to the permeability of stricture, a circumstance which I now regard as one of the most valuable of the many important lessons I learned from that most able, fearless, and honest man. I have in the course of my life met with three instances in which, after much careful manipulation, I have been unable to pass an instrument fairly into the bladder; and in these three instances only have I performed perineal section for the relief of stricture, without a guide previously passed. Between 1852 and 1855 I operated by Syme's method of external urethrotomy upon a grooved staff, nine times only; thenceforth exchanging it for internal urethrotomy, which I have practised systematically ever since; at first on the very worst forms of the disease only, and gradually as the result of increased confidence in it, and satisfaction with its results, much more frequently than at first. And now and then, but very rarely—for example, when large abscesses and perineal fistulæ affect the perinæum—the division on a grooved staff has still been resorted to.

These remarks on this very important subject lead me now to present briefly an epitome of what my experience has led me to regard as the safest and most efficient mode of treating a confirmed example of organised deposit in or about the wall of the urethra, so that it is incapable of adequately dilating to the pressure of

urine ejected by the bladder, the only condition to which the term 'stricture' is either conveniently or logically applicable.

I think it will be agreed by most experienced surgeons, that on first verifying the existence of an organic urethral narrowing, *the history of which is recent*, as a rule, nothing need be done beyond gradually restoring the calibre of the canal to its normal state or thereabouts, by means of flexible bougies more or less tapering towards the point. The well-known form styled 'olivaire' can scarcely be improved; while for those cases in which it is desired to carry the process of dilatation as far as possible, the well-polished tapering silver or silver-plated steel dilators are most efficient, and at the same time unirritating to the passage. Modifications of the flexible bougie are, however, now so numerous in regard of form, material, and even also of their internal contents, that each surgeon will doubtless employ most advantageously that which best accords with his own views, and with his own manner of manipulating. There are of course congenital organic, as well as acquired narrowings of the external meatus, and also situate near thereto, which will not dilate, and which a simple incision suffices to divide. Strictures also affecting the canal within three or four inches of the orifice do not benefit much, or for any prolonged period, by dilatation. But when in the ordinary case before referred to, the canal has been restored to a full calibre by dilatation, it may be often maintained so, by an occasional, regular use of the bougie, by the patient himself, for several, sometimes for many years. In after life, however, as all the tissues become more rigid, those which form the stricture also dilate less readily, and a smaller instrument only can be passed with comfort. Occasionally, indeed, even this sign scarcely shows itself, for which reason I think it unwise, as a rule, to propose any operation in the early stage of stricture; but prefer to afford a patient the chance of its being amenable for many years, if not altogether, to the very simple treatment indicated. But if strong tendency to contract manifests itself at an early stage, or whenever it does so after the lapse of time, it is wise, in my opinion, to resort to internal urethrotomy without delay. Were this plan always pursued we should have no perineal abscesses or fistulæ, no consecutive chronic cystitis, with organic changes in the bladder, ureters, and kidneys as a result. To advise the delay of an operation until symptoms indicate that such complications are

appearing or already exist, involves complicity in a course which irretrievably damages the patient's life, and forces the adoption of a period for the performance of a simple operation when his enfeebled condition suffices of itself to add an element of risk to the proceeding. Hence I have no hesitation, now, in advising internal urethrotomy, whenever organic stricture, single or multiple, near or distant from the meatus, shows signs of not yielding readily to dilatation. No delay is in these circumstances of any value as regards the stricture itself. Division must be made sooner or later if the organs behind are to be preserved from irremediable injury; and the sooner, therefore, other conditions being favourable, the urethra is rendered freely patent, the better will it be for the subject of it. There is another consideration also in relation to this matter, which may influence our counsel to a patient; and one which in this country often presents itself. A young man with well-marked stricture is under orders to go abroad for a long term of years in one of the services, or he is emigrating to the colonies; in any circumstances, running risks of danger from exposure, from absence of surgical aid on an emergency, &c., which are not encountered at home. For such a patient, an efficient urethrotomy should be performed; and during his treatment he is concurrently made familiar with the management of the bougie for himself, an accomplishment often valuable in after life.

When cases are first met with in a more advanced stage; when the use of dilating instruments is liable to be followed by temporary retention of urine, or by rigors, then very little question can arise as to the propriety of operating. It is very rarely too late to incur any risk there may be in doing so; at all events, in private practice; and the persistence of the phenomena mentioned, if not checked, must infallibly undermine the constitution of those who are the subjects of them. In relation to those cases in which rigors almost always occur after the passing of a bougie, I know nothing so admirable as the results of urethrotomy.

Many times I have had to verify the following fact: so often that I rarely hesitate now to foretell it when the circumstances arise in practice; namely, that given a patient, who for months past has experienced a severe attack of urethral fever whenever a bougie has been passed into his bladder; you shall make for

that patient a complete division of every part of the strictured canal, and even the operation itself will not be followed by any rigor whatever; nor will he be likely to experience another throughout his subsequent treatment. But if the division is imperfect, and here an important fact reveals itself, such a result is not ensured; the rigors will almost certainly reappear.

I am convinced, therefore, of the necessity of ensuring complete division of all the obstructing tissue, not only in relation to future results, but to the present well-doing of the patient, and thus have an additional support for the value of my maxim, 'If you cut at all, cut all.'

This brings me to a very important subject: How are we best to ascertain, before undertaking to divide the morbid tissues constituting stricture, what are their extent and situation? How are we best to survey the country, so as to attain an accurate estimate of the locality before proceeding to any operations upon it, since the knowledge referred to is absolutely essential, in order that they should be safely and efficiently performed? In technical terms—What is necessary, for our purpose, to be done in order to diagnose the physical condition of the urethra?

It may first of all be remarked, that in a simple and recent case of strictured urethra, and therefore for a large proportion of all the cases of stricture, a very simple proceeding suffices to ascertain where and to what extent the canal has been morbidly narrowed. And as all instrumental interference with the urethra, however delicately effected, is more or less painful to the subject of it, and provokes irritation, which in a few persons is serious, we are not warranted in introducing large and complicated mechanical contrivances for the purposes of diagnosis in these recent and simple cases, if, indeed, we are in those which are severe; although the latter opinion may perhaps be questioned by some.

For a recent case it suffices for the purpose to introduce a full-sized bougie, by which I mean one which will pass in a healthy urethra without stretching it, merely separating its closely applied walls to about the same extent as the flow of a full quantity of urine will do when it passes naturally. Such a stream in most persons equals a volume, perhaps of 10, 11, or 12 of the English scale; or Nos. 18 to 22 of the generally accepted 'filière française.' If such an instrument fails to pass, we diminish the size until one is

found which does pass: after which dilatation may be effected often with speedy and good result, and nothing more may be necessary. But if more specific information is desired for an exceptional case, a series of solid bulbous-ended instruments, of which the stem is slender, and each bulb follows the sizes of the catheter scale employed, will supply accurately the data required, and on the easiest terms possible to be attained. Such a series I have used for thirty years, and no other except for trial; and some of those now before you were made for me at the commencement of that period. I have never seen any plan to equal this for simplicity, efficiency, for facility in passing, and, most important, for effecting the object without inducing irritation. The well-polished metallic surface, the conical or acorn-like form of the end, ensure this result. They are better also than flexible instruments of the same form, which are less easily used, and are far less accurate in the indications they afford. These metal bulbous instruments were used by a generation or two at least preceding our own, and are better also in my opinion than the many ingeniously constructed, but more complicated machines, which our friends the surgical instrument makers have, very naturally, made for sale.

But the information such instruments supply is rarely wanted, unless the surgeon proposes to make an incision through the strictured portions of the urethra. In view of urethrotomy, however, that information is essential for the right performance of the operation.

Let us suppose the case of a patient for whom it is decided to perform internal urethrotomy. The external meatus is first examined, and is often found to be a little contracted; a bulb, say No. 11 or 12 in size, passes tightly through it, and stops, perhaps at an inch or more from the orifice. After the use of three or four smaller sizes, a No. 9 passes, and may be supposed to meet a check at five inches, and here, after other trials, a No. 2 or 3 goes on into the bladder. Before withdrawing the instrument, the surgeon may trace with his finger the course of the urethra in the perineum, beneath the scrotum forwards, and learn what amount of thickening exists around the canal. He can frequently thus detect the presence of deposit, as a nodule marking each seat of stricture, as if a ring of some material more or less encircled the canal; and on withdrawing the bulbous instrument the situation of the contracted parts is again verified by

the check which the bulb receives in passing them in its progress outwards. It is clear, therefore, in such a case, that there are at least two chief points requiring incision besides the orifice. This is all that need be ascertained before the patient is rendered insensible for operation, when the examination may be repeated, if the surgeon desires to do so with more minuteness before incising.

Now, at this point it is necessary to consider some preliminary questions of importance; namely, What is the principle on which an intra-urethral incision which is out of sight ought to be made, and what is the best instrument to accomplish our purpose? Is the division of tissue to be a complete one, and to be made solely according to the judgment of the operator; or is it to be made by a machine, the action of which is not necessarily to divide all opposing tissue, but simply to incise enough to permit the introduction of a fair-sized catheter through the urethra when the cutting instrument is withdrawn? For example, we may introduce a small grooved staff along the urethra into the bladder, and then slide along the directing groove a blade more or less protected, so as to divide the tissues which lie within range of its point or edge; and thus the operation is very easily and very speedily performed. Such mechanism has long existed in numerous forms, as urethrotomes under the name of Ricord, Leroy d'Etoilles, Charrière, Trelat, and more recently those of Maisonneuve, Sedillot, and Voillemier, and others. However small the lumen of the stricture, a grooved director of corresponding size being carried safely through it, no preparation preliminary to the use of the cutting blade is necessary; a single pressure of the hand completes the proceeding. But this, I contend, is by no means a satisfactory mode of dealing with urethral obstruction, if its complete division is the object to be attained. Complete division, indeed, is rarely thus accomplished; generally some fibres escape the blade; the result in any case is, in my opinion, uncertain, and is far less perfect and effective than that which follows a section made by a knife which is directed by the will of the surgeon, and manipulated according to the amount of resistance encountered at the time, and to the extent of obstruction previously ascertained by exploration. I suppose that a keen blade of appropriate form, and completely under the control of his hand, would be always employed by a surgeon, for use in any other part of the body than the urethra, when he

desires to make an incision, the limits of which are to be carefully defined. For my own part, I can see no reason why that spot alone should be excepted from the action of this principle. Take the obstructing bands confining a hernial protrusion of bowel, for example; here the finger and the blade act in perfect harmony; the section depending entirely on the delicate perceptions of the former, which determine the surgeon's judgment during every moment of the cutting act. The section in tenotomy is perhaps a still more apposite illustration of the necessity that exists for an intelligently made division of every fibre which opposes the return of the limb to its natural position. In both instances section is made from the sense of touch only and without the aid of vision, and a like control should, I think, govern the act of dividing those bands which encompass the urethra and form the stricture. No mode of section is half so certain, so safe, and so satisfactory, as that of drawing through them, from within outwards, a little blade attached firmly to a long slender handle; a proceeding completely under the control of the surgeon's hand. I know that this is not the generally accepted mode of operating either here or elsewhere. It is precisely for that reason—cherishing as I do strong convictions as to the superiority of the method—that I have determined to make its advocacy one of the main themes for our consideration to-day. I am told both here and abroad that the cutting blade sliding in a groove, of which Maisonneuve's instrument is the type, is so simple and safe a proceeding, that any man, however unpractised, may perform it. Is that a reason in its favour? The same doctrine was very lately taught in relation to the method of splitting strictures, by means of two diverging rods, at one time so much in vogue; now so completely and so properly neglected, but always so easy of performance! Are we to accept an unsatisfactory proceeding because of its universal applicability, and thus be content to establish an imperfect standard for the sake of bringing it within the reach of incompetent operators? Between the two systems now under consideration there is this difference: one is the product of a machine, the other is the handicraft of an artist. And the same distinction which is so obvious in regard of innumerable forms of human activity, between the uniform and commonplace results of machinery and the finished achievements of the intelligent, painstaking artist, marks the character of the

two modes of operating now in question. And let me remark that the practice of operative surgery becomes a sorry occupation, if it be not indeed an art, and a very fine art too. So far as it becomes a mere matter of mechanical contrivance, it ceases to be worthy the devotion of a man of parts. The instrument maker, with his purely mechanical knowledge, and ideas arising therefrom, often useful, has nevertheless always been a seductive and dangerous ally for the surgeon. Let us be grateful to him for valuable aid, accepting it with discrimination—and beware of him always! A cultivated hand is the most cunning and effective source of power, and the simpler the instrument employed, the greater is the influence of that hand, and of the intelligence which guides and permeates it.

In dividing stricture during the last twenty-five years, I have used only a little blade with a long handle, and I have always commenced by placing that blade on the farther side of the stricture, and made the incision in a direction towards me, that is, from behind forwards, cutting just so much in length and in depth as the obstruction perceived at the moment appears to demand. Just as I have above said, in hernia, or in tenotomy, we should divide opposing tissue until resistance ceases.

Now, in order to place a small blade beyond, or on the bladder side of a stricture, a certain amount of space in the urethra is required. In the case above supposed, in which the deeper stricture of the two admits a bougie No. 2 or 3 in size, there is not room for a sufficiently strong instrument containing the blade to be so placed. But a little dilatation will enable it to pass: the calibre of No. 5 (English) suffices for our purpose. Hence in such a case I should simply tie in a gum catheter (No. 1 or 2 in size is ample for the purpose, and being small produces no irritation), and retain it there two or at most four days. By that time, without changing the catheter for a larger one, or if so only once, the necessary enlargement of calibre is accomplished.

The urethrotome which I employ, although made on the principle of one used many years ago by Civiale, has been materially modified by myself. The mode in which I apply it also widely differs from his method already referred to. The terminal bulb, which is conical, has a maximum diameter of No. 5, the stem is about No. 2½ or 3 (see fig. 1). The bulbous sounds which are previously employed in order to ascertain the

position, extent, and calibre of the stricture, have terminals precisely like that of the urethrotome in form. The length of the stem—that is, the distance between the handle and the

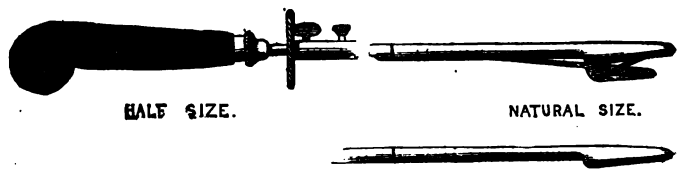


FIG. 1.—The terminal bulb of the urethrotome is conical in form, measuring No. 5 (English) at its base. The cone projects further over the stem on one side than on the other, a form which enables the operator to appreciate the situation of the stricture better than if the stem were centrally placed.

terminal—corresponds exactly with that of the stem of the urethrotome, and it is shown in inches on each instrument by graduation on the stem (see fig. 2).

The patient being under the influence of an anæsthetic, the little catheter which has been tied in is withdrawn, and the

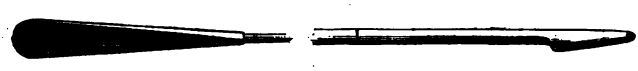


FIG. 2.—The bulbous sounds, employed in various sizes, are made in precisely the same form.

urethrotome is first introduced as far as to the deep-seated stricture through which the terminal bulb is then insinuated. It must now be passed fully half or three-quarters of an inch farther in, that is, beyond the stricture, and the blade being exposed in a direction towards the floor, is pressed firmly thereon and drawn forward, until resistance, sometimes considerable, is perceived; the movement then continues steadily outwards until that resistance is completely overcome. A touch on the button near the handle sheathes the blade, and the outward movement proceeds until the site of the second stricture is reached, when another incision is made in the same manner as before. The urethrotome is then withdrawn, and the meatus freely divided by a scalpel or by a short urethrotome adapted for the purpose. I next take a blunt metal bougie or dilator, No. 15 or 16 in size, or a bulbous instrument of that number, and ascertain if it will pass without obstruction into the bladder. It generally does so

at once; if, however, its progress is arrested at any point, the situation of this is carefully noted, when I withdraw the dilator, reintroduce the original urethrotome, and divide the opposing tissue. But this, as I before said, is seldom necessary. I may add that I am very rarely satisfied with anything less than the free and easy passage after the operation of a metallic sound, No. 16 in size: in some cases No. 17 or even 18 will pass. A gum-elastic catheter, No. 12 or 13, is then tied in, and should remain always 48 hours, with an extra 24 or 48 hours if the incisions have been deeper than usual, or if hæmorrhage is free or continuous, the latter being a very exceptional occurrence.

It is sometimes objected that if a small instrument can be easily passed through the stricture, and if this may be easily dilated so as to admit a urethrotome as large as No. 5, why should any cutting operation be performed? The reply need only be brief. The chief object of division is to protect the patient against the speedy reappearance of an obstruction; to remedy the tendency to recontract, which certain strictures exhibit, and which almost all do when they have continued several years. The lumen of a stricture may be very small, but this fact alone is not the motive for a cutting operation. Any stricture, however narrow, may be dilated to almost any calibre desired by tying in a succession of flexible gum catheters. *It is the tendency to narrow rapidly after any dilatation*, which determines our advice to the patient to submit to urethrotomy. In other words, it is marked contractility in a stricture, and not mere narrowness, which renders operation by incision desirable.

An important inquiry remains—What are the results of internal urethrotomy in relation to the reappearance of stricture? Does the operation free the subject of it from that liability to return which constitutes the very serious character of the disease when treated only by dilatation?

The reply to this question cannot be a simple and categorical one; it must be made with limitations.

I may remark, first, that it may be taken for granted, as already intimated, that no mode of urethrotomy which fails to insure complete division of the obstructing tissues has a chance of affording permanent immunity from the complaint. Whatever be the mode of operating, whether by a machine which is uncertain, or by the inadequate use of any form of urethrotome, how-

ever perfect; if incomplete division only is effected, the patient will find his urethra narrowing after a more or less prolonged interval of time.

What happens then in those cases in which, as far as the operator can judge, he has effected a complete division?

Well, I am free to confess that my experience does not warrant me in saying that it is possible to promise immunity from return. We may often regard the period of return as remote; we may produce a condition of urethra which is easily maintained by occasional regular dilatation, a procedure which before the operation was not only ineffective but painful and irritating. We may place a patient in a condition of health and comfort for several years, meantime saving his bladder, ureters, and kidneys from the slowly but surely occurring grave changes which threaten his existence. Now and then, but rarely, I have met with a case in which the patient's troubles have not reappeared. I am certain we cannot reckon on this result as a rule, and I mistrust claims to the contrary as due to error of judgment, or want of information, or as prematurely made, i.e. without waiting sufficiently long to observe remote results. In enunciating this opinion I have no hesitation whatever. But herein I have stated the worst in regard of the patient's prospects, and have shown you the reverse of the medal.

Because, supposing, after a few years, the patient finds himself unable, through the reappearance of contraction, to pass a full-sized bougie; having, on the contrary, by degrees been compelled to content himself, at his periodical use of it, with one only half the size of that, or less, which was employed for a considerable period following the operation, division can again be resorted to. It is not a dangerous proceeding, necessarily occasioning hesitation on the part of the patient, when his condition demands relief. Just as, in calculous cases, a second, a third, or even a fourth stone can be, and often is, safely removed by lithotrity when, after the lapse of considerable periods of time, fresh products are formed; thus also may a stricture be dealt with a second or a third time if necessary. The circumstances of the calculous patient were, as we shall see in a future lecture, widely different when, lithotrity being unknown, the knife was the only means of removing the stone. So also when strictures were submitted, year after year, to dilatation, until it was necessary, in order to avoid impending

danger, to resort to a severe perineal operation, the prospects of the stricture-patient were vastly inferior to those which a well-performed internal urethrotomy secures for him now. By the prompt and effective application of this method, the disease may be in all cases confined to the canal, and the real gravamen of the malady, the implication of vital organs, certain to result after long-continued ineffective dilatation, is altogether avoided. If the use of the bougie, which is more or less necessary after urethrotomy, ever again becomes difficult or affords little relief, then, for most patients, the time has come to repeat the incision.

I have performed this operation now on between three and four hundred patients. Some of my earliest cases were, from want of sufficient confidence and experience, less completely and freely cut, than those on whom I have operated of late years: and a few of the early patients have been re-cut. I have not regretted this advice in a single instance: for the advantage to them has been undoubted. On a very few—I think three only—I have operated a third time. One of these, having suffered many years from a most obstinate and narrow contraction, has since the third operation, now twelve years ago, been perfectly free from his complaint, a very rare result. He is himself a well-known medical man.

The risk of the operation is very small. Estimating the number of patients on whom I have performed it as 340, which is within five more or less, the deaths have been six, or not two per cent. These were due to pyæmia in three; to embolism in one; to extravasation and exhaustion in two; one of the latter was a case in hospital almost thirty years ago, among my earliest, and he was unfit for any operation.

Among accidents not terminating fatally, extravasation of urine may be named as occurring four or five times, probably from removing the catheter too early. It was mostly slight, and provoking acute local abscess, rather than sloughing. The latest instance took place a few months since in a diabetic patient, seen by Dr. Pavy. He made a sound and not slow recovery, and the result of the operation on the urethra was excellent. I had not met with a similar accident for several years previously.

The sum of my experience is the expression of a strong conviction that internal urethrotomy, fully and completely performed, should be resorted to as the best and safest treatment of stricture,

as soon as the easy use of the bougie fails to maintain the urethra patent, or to allay signs of irritation in the bladder arising from the obstructed urethra. It is the best means not only for relieving urethral obstruction and its painful symptoms, but for insuring the future sound condition of the more deeply seated organs. I shall now take leave of this subject, gratefully thanking you, Mr. President and gentlemen, for the indulgent attention you have accorded me, and beg leave to announce as the subject of the next lecture, The Diagnosis of Urinary Diseases, and Digital Exploration of the Bladder.

LECTURE II.

THE SYSTEMATIC DIAGNOSIS OF URINARY DISEASE—DIGITAL EXPLORATION OF THE BLADDER AND ITS RESULTS.

WHEN an individual with impaired health presents himself for treatment, our first object is to form a diagnosis of his disease by investigating its phenomena. The account which he gives of his sensations is critically received and noted; the physical signs which relate to the performance of function, as well as those which denote some change in form and structure, are observed, and the secretions are chemically and microscopically examined.

These data being obtained, the diagnosis is generally clear. If it is not so, the defect is rarely due to our want of scientific knowledge of disease, but to our inability to obtain the facts required in the particular case. Thus the diagnosis of heart and lung diseases was very obscure, although their pathology was well understood, until the practice of auscultation and percussion revealed facts which had not been hitherto attainable during life. Hence it is now rare to meet with serious disease of those organs which, after adequate examination, can be termed obscure.

But in affections of the kidney and bladder, accessible as these organs are to inquiry, the one by sounding, the other through its secretion, it is still by no means uncommon to meet with a group of symptoms indicating serious disease, of which the diagnosis is by no means clear. The disease shall have existed for months, or even for years; careful examinations shall have been made by several observers, and yet, not only shall there be no agreement among them as to the nature of the affection, but differences of opinion may exist as to its locality; for example, as to whether the bladder or the kidney is the chief seat of the malady.

These obscure diseases, as already intimated, are for the most part chronic in their character. There is rarely any question of obscurity when dealing with acute disease, since the local pain

and other signs, as well as the condition of the urine, mostly suffice to indicate the organ which is affected.

It is for the purpose of facilitating the study and practice of diagnosis that I shall now endeavour, more fully than I have elsewhere hitherto done, to sketch a systematic mode of inquiry respecting those derangements of the urinary function which must be regarded either as signs or symptoms of disease in some part of the urinary organs. My object is to enable the student to arrive, by the shortest route, first, at the true facts of the case, and, secondly, at the conclusions which those facts warrant.

In pursuance of this plan let me premise that the male sex of the patient is always to be understood, modifications which are obvious, and therefore not specified, being requisite in cases of the other sex.

The first fact to be regarded in commencing an investigation relative to any morbid condition affecting the urinary organs is, that, with very rare exception, the act of micturition is always more *frequent* than natural. But it is particularly important to note whether that frequency is manifested more by night or by day, during rest of the body, or during movement, or any other circumstance which may thus affect the function.

Secondly, we are next to inquire whether *pain* is felt in micturition, and, if so, whether before, during, or after the act; also, what is the precise seat of the pain—in the penis, above the pubes, or elsewhere.

Thirdly, has *blood* been seen in the urine? is it brownish and intimately mixed, or not mixed and of a bright red colour? Has the stream been observed to commence with urine apparently normal, or with only a faint red tint, and to end in deep red, evidently charged with blood? Is the blood augmented by, or does it occur after, exercise?

Fourthly, the *character of the stream* is to be observed, whether it is small or full, irregular in form, feeble or forcible, continuous or the reverse, issuing in part or wholly by fistulous channels.

Fifthly, is the *urine altered* in appearance from the healthy standard, or, as observed by precise tests, in its physical or chemical qualities? Is it large or small in quantity? Are the normal constituents large or the reverse? or are any unnatural elements present, as albumen, sugar, &c.? leading to the whole

subject of urine analysis, which it cannot be necessary to pursue further in this place.[1]

Sixthly, inquiry must be made for the presence of pain in the back, loins, and hips, past or present, permanent or transitory, and for the occurrence of periodical attacks, obviously renal.

Lastly, signs of dropsy and other complications of imperfect renal function must be sought.

The prosecution of these inquiries, and especially made in this order, decides for a great number of cases the condition of the patient, but it will not do so in all. Physical examination is in some cases necessary. It is so when the stream of urine is habitually small, when micturition is frequent, painful, and difficult, when also it is feeble in elderly men; if obstruction is manifest in any case, if the urine be persistently alkaline and muco-purulent, if red blood is passed in the urine, and especially if symptoms of irritated bladder are also present.

The steps of physical diagnosis are very simple, easy of performance, and, although often much dreaded by the patient, entail only a moderate degree of pain when properly executed, and rarely any risk of exciting febrile or other disturbance if they are employed under certain conditions, *e.g.* with exceeding gentleness, not during the presence of local inflammation, and with due precautions of the patient afterwards.

Adequate patency of the urethra is determined by passing a soft bougie of moderate size; ability of the bladder to empty itself by the natural efforts by passing a flexible catheter immediately after the act of micturition; the presence of a foreign body by introducing a small beaked sound and prosecuting the search in a systematic but delicate and gentle manner. The condition of the prostate and base of the bladder is ascertained by rectal examination with the finger, searching there for hypertrophy, cancerous deposit, and for calculus in exceptional circumstances, such as impaction, irregular situation, unusual size, &c.; palpation and percussion of abdomen in the suprapubic region and in both renal regions, in the line of the ureters, for retained urine, tumour, enlargement, fluctuation, points of tenderness, &c.

The outline of an exhaustive scheme of research has thus been presented; one which suffices for the solution of a very large pro-

[1] See *Clinical Lectures*, by the Author, Lect. XXIV. 7th edition. London: Churchill, 1883.

portion of all the cases which occur in practice. I think it may be fairly said to be adequate to the solution of ninety-nine out of one hundred, so far as a rough numerical estimate be possible.

But it follows that the most patient application of the inquiry described sometimes fails to reveal the cause of symptoms; although it may, and often does, arouse suspicions as to what that cause may be. Thus, the evidence available in an exceptionally obscure case may point in the direction of impacted calculus, which is associated usually with extremely painful and frequent micturition, and muco-purulent urine; or may indicate the presence of a growth within the bladder (not cancerous deposit in its walls, which is readily recognised from the rectum), such growth being usually associated with long-continued or repeated bleeding, and sooner or later depositing in the urine organic débris, the structure of which may determine its character. In either case no permanent relief is attainable without operation.

Besides the conditions named, there may be, as in the cases of elderly men who are unable to pass any urine without very frequent catheterism, another cause, not very infrequent, of the most distressing cystitis; one that is rarely amenable to relief by ordinary treatment, because the cystitis itself is maintained by the very agency, the catheter, without which the patient's existence is impossible. A vicious circle of actions is thus set going, which can only move from bad to worse. In all the conditions described the patient's fate is sealed; but even this grave fact does not disclose all the severity of his lot, since it is almost inevitable that the fatal event must arrive through severe and protracted suffering. The painful experience which I have necessarily had of so much misery of this kind, and for which, in the later stages of disease, little relief is afforded except through the influence of narcotics, has long impressed me strongly with the desire and the hope of finding the means of escape for some of these patients, equally from the fatal issue and from the suffering which precedes it.

Fifteen years ago (January 1869), for a man about sixty years of age, in University College Hospital, I first opened a bladder with the sole view of affording relief in a case of painful cystitis of the kind described, no crisis of retention being present, by making a suprapubic opening and maintaining a tube there during some weeks, in order to drain and relieve the bladder. I

repeated this proceeding in six other cases, affording some relief, but with less of permanent benefit to patients than I had hoped to attain. The opening was ill-placed for drainage purposes; it became very sore from contact with urine, and kept the patient for the most part confined to his room. But the last case in which I did this operation was so remarkable, and impressed me so strongly, that from that time I determined on a different course for the future; and this at length issued in the plan which I have now put in practice nearly four years, and the results of which I shall lay before you without any reserve to-day. But first I shall ask you to listen to a very brief report of the case just referred to.

Mr. C. was aged 31 when first seen by me in 1870. During the previous six years has had occasional attacks of bleeding. The urine always more bloody at the end of the stream than at the beginning. The vesical origin of it was on this ground suspected at that time.

After two or three visits, he took a sea voyage for his health, and thought himself cured. But he came again in October 1874, having had several fresh attacks recently. I sounded him, and felt nothing; some fusiform cells were observed in the urine, and are sketched in the note-book at that visit.

1876. Has continued to bleed, and more frequently. Found three ounces of residual urine, and advised use of catheter daily; which was found to check bleeding, as when there was no straining there was no blood.

1877. Passes shreds of organic tissue; sounded, nothing felt; weaker; micturition frequent and painful.

1878. Sufferings so great in micturition that I resolved to make a suprapubic opening into the bladder to rest and drain it, and enable him to obtain some sleep, which has been terribly broken by constant straining. The operation afforded some relief, but he gradually became weaker and sank about a month afterwards.

At the autopsy a single pedunculated tumour was found in the bladder; it resembled in form and size an ordinary fig. It could have been easily removed had the suprapubic opening been enlarged (see fig. 3).

FIG. 3.—Fimbriated Papilloma, with narrow peduncle. From case of Clark, æt. 38. Museum of University College, No. 1500.

It was clear to me from this case that the ordinary sound, 'a lengthened finger' in practised hands, as I had often and truly

termed it to my class, had proved incapable of giving me sufficient information relative to the presence of a considerable growth within the bladder. Supposing that I could but once have put my real finger there, instantly discovering, as I should have done, that easily removable tumour, how different would have been the issue of that unhappy case! He might have been enjoying life and health to-day! What, then, was to prevent me in future, under circumstances of equal gravity and like obscurity, from determining the presence or absence of such a growth by the direct sense of touch, as I could so easily have done there, had the necessity for applying it ever occurred to me? The question which therefore naturally presented itself was: From which point could I best examine with my finger the whole interior surface of the bladder: from the perineum or from above the pubes? After experiment on the dead body, the answer seemed not doubtful. With a small opening into the membranous urethra from the perineum, just large enough to admit the finger to arrive at the neck of the bladder, and making at the same time firm suprapubic pressure, I could explore without difficulty every portion of the surface described. If then by means of anæsthesia I could attain that degree of flaccidity and inertia in the living body which is natural to the dead subject, why should I not be able to effect as easily the exploration in the former case as in the latter?

Opportunity for making the experiment soon occurred, partly in the course of a lithotomy case or two; and finally in the person of a patient who came under my care in 1880, with severe and obscure symptoms. At the outset of the case I met with a small calculus and crushed it, but subsequently found another, as I thought, impacted, not being able to remove it by the lithotrite. It was with the object of ascertaining the real state of the case that I decided to explore the bladder, and did so in November of that year. I invited Dr. Seegen, of Vienna, and Dr. Paggi, of Florence, who happened to be in town, as well as Mr. Ceely, of Aylesbury, to be present. Having made the median incisions, and complete flaccidity of the abdominal muscles having been attained by the influence of ether, I felt, as soon as the finger entered the bladder, that there was no difficulty in exploring the whole interior, and soon detected the presence, not of a stone, but, to my surprise, of a single pedunculated tumour of considerable size, with a

thick coating of phosphates deposited on the surface. It had been this coating, together with the immobility of the mass as previously determined by a lithotrite, which had suggested to me the presence of impacted calculus. I seized the tumour with a small lithotomy forceps and twisted it off at the neck. The patient, contrary to my expectations, made a rapid recovery; had no return of the growth or any sign thereof, and has enjoyed excellent health and activity ever since, as he does at this day. That operation took place in the autumn of 1880, now nearly four years ago. The case, with diagram of the growth removed, forms No. 1 in the Table of Cases at the end of Lecture III. I waited a year and a half before presenting this man and his history to the fellows of the Royal Medical and Chirurgical Society, and before proposing also to make his case a precedent to be followed systematically in obscure cases for the future, having at this second date adopted the operation in three other cases of chronic bladder disease, which, however, were not examples of tumour in any form.

I then determined to regard the systematic examination of the bladder by means of the finger as a desirable and indeed as a necessary proceeding in obscure disease believed to affect the bladder, when other means, including careful sounding under ether, had failed to detect the cause. And in order to distinguish the new method, I termed it 'Digital Exploration of the Bladder,' and under this name I made the first published account of it, not in this country, but in *La Semaine Médicale* of Paris, on June 18, 1882; specifying also the cases in which it might be deemed applicable.

In the surgical proceeding itself there is nothing new, nor did it ever occur to me that it could be claimed in that sense by any modern surgeon. Like others, I had often opened the urethra from the perineum for stricture, for chronic and obstinate urinary fistulæ, for impacted calculus, for calculus sacculated in front of the neck of the bladder, and once after lithotrity when the patient could pass no urine except by catheter, and was unable to introduce the instrument, &c. But the object with which I have recently proposed to operate is a new one, inasmuch as it is solely the exploration of every part of the bladder with the end of the finger, in order to diagnose its condition, and not by any means necessarily to perform any further operation, unless indeed this

should turn out to be required by the discovery of a tumour or other condition admitting of surgical treatment. To effect this purpose, then, it was extremely important to determine what is the shortest and easiest route for the surgeon, and, at the same time, by what method would the smallest amount of risk to the patient be incurred.

At first sight it appeared that an incision involving the neck of the bladder must be necessary, and that the operation must therefore be some form of cystotomy. Happily experiment proved that no such extended incision would be required, and that a section carried from the perineum to the urethra, in other words 'external urethrotomy,' would suffice for my purpose.[1] Now, this is a procedure almost without risk. The mere section of parts from the perineal surface in the median line, down to any part of the urethra anterior to the prostate, is one of the simplest and least dangerous of surgical operations. If in addition to the section the prostatic urethra, together with the wound, have to form a route for the repeated introduction of instruments, and for the removal of a tumour, the risk is increased in proportion to the amount of work to be done; but even then the fresh danger incurred does not arise from the urethral lesion so much as from the process of detaching the growth from the walls of the bladder.

In lithotomy the urethral route, and particularly the neck of the bladder, are injured by forcible extraction of a large and rough calculus, but nothing analogous to that dangerous process occurs in the removal of tumour.

Old, however, as is the surgical proceeding in question, whether in modern language it be termed 'external urethrotomy,' or, as with the older French surgeons, the quaint term of the 'boutonnière' be adopted (the term itself shows how very simple even at that period they considered it), the mode of performing it appears to me, after a considerable experience, not altogether a matter of indifference. I shall in the first place, however, premise that there is no longer any doubt that the median in-

[1] It fell to my lot to write a brief history of that operation for my earliest Jacksonian prize essay in 1851, and I recorded there that it was practised in the end of the seventeenth century by Richard Wiseman in this country, and that at about the same period, and subsequently, it was known and practised in France, under the name of the 'boutonnière,' by Tolet, Colot, Petit, Ledran, and others. By all these it had been adopted to give an outlet to retained urine, and to relieve impassable stricture. My purpose, however, was wholly different, as is seen above.

cision of the perineum opens a shorter road to the neck of the bladder than an incision commenced from any lateral part of that region, although the question has been raised. Considering this point to be determined, I shall briefly describe the steps of the proceeding which appear to me the most desirable to be followed in order to attain the end proposed with ease and safety.

The position of the patient, and the general accessories necessary, are those required for lithotomy. After ether has been given, a median staff with a short curve, wide and deeply grooved, is passed into the bladder, and the patient is brought down to the edge of the table, the feet and hands are attached by anklets and wristbands and held by two assistants in the usual manner, another holding the staff. The surgeon, being seated, introduces into the rectum his left forefinger, so as to feel with its tip the position of the grooved staff, separated by intervening tissues, and to verify the apex of the prostate, on which he may place the point of his finger as a guide. He may take the handle of the staff with his right hand and place it in the position required, before returning it to the hand of the assistant. Maintaining his left index in the position described, the operator then makes, with a long, narrow, straight-backed bistoury (fig. 4), a vertical incision through the

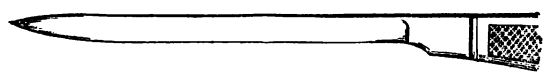


FIG. 4.

skin and cellular tissue in the middle line, say in the raphé, about an inch and a quarter long, the lower extremity of the incision terminating about three-quarters of an inch above the anus. He next enters the bistoury, with its cutting edge upwards, in a horizontal direction, at the lower part of the incision, just above the upper border of the bowel and parallel with it, and guided partially by the proximity of the left index, there directs the point inwards until it arrives at the membranous part of the urethra, which it penetrates, entering firmly the groove of the staff. Contact being distinct, he incises the urethra on the staff for a few lines by a backward and forward movement of the point, and then withdraws the bistoury, cutting slightly perhaps a little of the tissues upwards as he does so, avoiding as far as possible any section of the bulb itself, and making room enough only for the finger to enter. He now inserts in the groove of the staff the

tapering gorget-like director (which may itself be grooved in order to enter on the back of the knife which has been employed, and before the latter has been removed) (fig. 5), and presses it gently inwards along the urethra to the bladder, and he may at the same time remove the left index from the rectum and take the staff in that hand, so as to handle the two instruments simultaneously. The staff is withdrawn, the director maintained in place by the right hand, the left index is slowly and gently insinuated along the

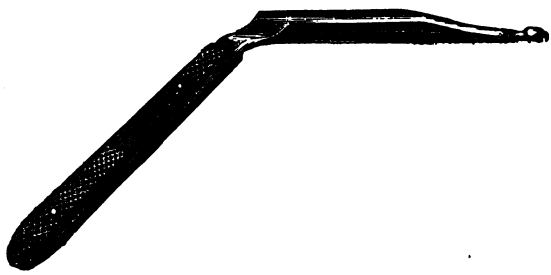


FIG. 5.

director through the neck of the bladder, when the director is withdrawn. The tip of the exploring finger is now in ordinary circumstances felt free in the cavity of the bladder, and not unfrequently at once comes into contact with and recognises the morbid condition for which the exploration was undertaken. Whether or no, the operator, maintaining the index in its place, and firmly pressing it into the cavity of the bladder, rises from his seat if necessary, and stands so that by means of his own right hand he can make firm suprapubic pressure, and bring the upper surface of the bladder into contact with the left index. This is easily accomplished if anæsthesia is complete, that is, renders the abdominal muscles quite inert and flaccid. He rapidly ascertains the presence or absence of tumour; if absent, he will by slightly changing the point of suprapubic pressure, and also, as far as he can, the direction of the tip of the left index, carefully examine bit by bit the whole internal surface of the bladder. He will first be acquainted with the condition of the mucous membrane lining the cavity, and observe whether it possesses the smooth satin-like surface, so characteristic of the vesical lining membrane in health, or whether it is more or less roughened or velvety in places, for that condition rarely affects the entire area. He may find on the contrary an irregular surface elevated in places by interlacing

lines of fibres, with corresponding depressions and interstices, the signs of hypertrophy of the muscular coat; while the existence of inequalities in the surface of any kind, such as small papillæ, or so-called 'villi,' is at the same time determined.

Further examination with the finger-nail may detach from the wall some rough-feeling material; and a more or less substantial film may be found, to which earthy deposits adhere, like a false membrane which may be peeled off and removed. In other cases a complete scale of phosphatic crust may be encountered, rather closely attached to a roughened portion of the wall, and be separated from it without difficulty. And sometimes the finger may discover a small calculus half exposed, half hidden, occupying partially, or almost completely, a little sac, or lodged in a crevice, as it were, and merely protruding from between two hypertrophied folds or rugæ, which hold it in a position where it has perhaps defied both the sound and the lithotrite. All forms of prostatic outgrowth are met with, their interference with the vesical function can be studied, in the relations which they hold as to size and situation to the neck of the bladder; some of them being thus possibly rendered amenable in a slight degree to surgical treatment after such recognition has been made, as we shall see in the Fourth Lecture; and as is partially illustrated by a case, No. 41, in the series of cases which follows this lecture.

Indeed, it is difficult to say at present what may not be found, as fresh experiences have brought to light conditions to some extent not heretofore recognised, of which I have yet to speak. Hence there are few occasions, I confess, which for me have excited a more lively interest, than the moment at which my finger enters a bladder, the condition of which has been a theme of keen inquiry and speculation for some months or even for years before.

Almost certainly, at that moment the cause is revealed, and the practical surgeon only can understand, if I permit myself to say how grateful is the sense of satisfaction when it is suddenly discovered that the event has amply justified the procedure, and that the cause of years of suffering is judged after examination to be safely within our power to remove. I doubt whether the keenest hunter in quest of adventure, or most indefatigable and hardy explorer of an unknown continent, realises, after long and patient toil, happier moments following success, than does

the operator, who, after protracted care and research, tracks to a hidden source the cause of certainly impending death, and is able to save the victim!

To return, supposing it is at once apparent from the examination just described that tumour is present, the operator must next deliberately study its size, form, situation, and mode of attachment to the bladder. This is an extremely important matter, and will be considered, as well as the best mode of removing the growth, in the next lecture devoted to the subject of vesical tumour.

On the other hand, no growth having been found, the next steps of the proceeding will depend on what other morbid or irregular condition has been revealed. Supposing that either some calculus or other matter has been removed, or that the bladder and urethra are to be maintained in a state of rest in order completely to suspend their functions for a few days, free exit for the urine must be secured. For this purpose a soft but stout india-rubber tube, with a clear calibre of a fourth of an inch, having a lateral as well as a terminal opening, and about six inches long, is to be fastened with one end (smoothly bevelled) just within the bladder, the remainder occupying the wound, and protruding so as to convey the urine direct to some vessel suitable to receive it. If the object of treatment is that last described, the tube should remain a week or so, unless its presence occasions pain, in which case a soft large catheter may be tried; or, as sometimes happens, it is better after the first or second day to dispense with any instrument, and allow the urine to take its course through the wound. If, however, the tube produces little or no irritation, it should remain several days, until the bladder has been rested and drained, say at least for a week; even a longer period is sometimes advantageous (see Cases 5, 8, and 43). The relief from frequent habitual catheterism thus afforded to a patient who for months perhaps has been compelled to use a catheter twelve times or more frequently every day, is so great that he often desires the period of drainage to be prolonged, and thus the term of rest to be extended. To a man who has for some months before never enjoyed two consecutive hours of sleep—and in some of these long-standing cases the term of rest does not even reach one hour—the ability to lie unmoved and be undisturbed for an unlimited period of time constitutes an indulgence which he

appreciates to the utmost, and which has often the happiest effect on his digestion, his strength, and his spirits. I have seen some very remarkable examples of relief arising from the process, and relief of a permanent character.

It will be natural in this place to advert for a few moments to the analogous operation in the female when dealing with obscure forms of disease for the purposes of diagnosis and treatment. In order to accomplish a digital exploration of the female bladder, all that is needful is sufficient dilatation of the urethra, to admit the introduction of the index finger, which may be accomplished by means of a three-bladed dilator or otherwise, after which the facility for examining is of course greater than that attained after perineal incision in the male. Dilatation, however, always comprehends, I think, in whatever way it is rapidly performed, a certain amount of splitting or rupture of the urethra, which, however, I have never known to be followed by any permanent injury. I have thus examined five cases of women for the purpose of diagnosis, and have found tumour in two, and removed both without any further enlargement of the opening. These will be included in the list of cases below, which I now desire to present as the sum total of my experience of digital exploration of the bladder, together with the results which have followed in each case. In every instance in which tumour was met with, the fact only will be noted, and no history or results will be appended here, as the consideration of the tumour cases will be made separately, when the study of that interesting and important subject comes before us, as it will do in the succeeding lecture.

It has been objected by some that when the prostate is largely hypertrophied, especially in a fat subject, it is not possible to explore the bladder by means of the proceeding here described. Hypothetically the objection appears important, but my experience shows that the difficulty supposed is rarely considerable; in only one instance have I failed to reach the whole of the internal surface of the cavity.

If only the anæsthesia is complete, our purpose is effected much more easily than most persons would *à priori* imagine. In fact, before such anæsthesia had become possible, digital exploration of the bladder would not have been proposed, and certainly could not have been accomplished. It is one of the

many applications of surgical art which owe their origin solely to that influence. For if absolute and complete flaccidity of the abdominal muscles is thus attained, it is surprising how the contents of the pelvis can be pressed down towards the perineum by a strong and determined assistant, and can be reached by the operator, however large the prostate. But if the etherist permits the patient any power of resisting with the abdominal muscles, the effort is hopeless, and failure in the attempt to explore is, I believe, more likely to arise from that circumstance than from any other.

Further, it cannot be frequently necessary to make a digital exploration in cases of very large prostate, inasmuch as the cause of symptoms is generally sufficiently patent, and therefore does not call for further inquiry.

The bladder, however, may require to be drained in advanced disease of this kind; and this is often done with great and permanent benefit; for which purpose the small urethral incision suffices. To this proceeding the enlarged prostate offers no impediment; but complete exploration of the bladder in such a case is not required, unless unusual symptoms are present, which the enlargement and consequent obstruction do not suffice to explain.

I shall now present, in the briefest possible terms, a list of all the cases on which I have performed digital exploration of the bladder, forty-two in number. In twenty of these, tumour was found. These latter cases will only be named here, since the details concerning them will be required, and will be dealt with, in the succeeding lectures on that subject. The object of the following record is to indicate all the various conditions for which the operation was resorted to, and the results which followed its performance.

On carefully analysing these cases, there appear to be four chief forms of vesical disease, in which the operation of opening the urethra for the purpose of withdrawing the urine altogether by an artificial route, and so suspending the functions both of the bladder and urethra for a time, may render good service. Then, besides these, there remains a fifth class of cases, namely those in which the operation is undertaken solely with the view of exploring, when the presence of tumour may be strongly suspected.

The first class consists of those cases, not unfrequently met

with, in which all the symptoms of chronic cystitis have existed for a long period, and in a severe degree, and which persist in spite of long-continued and appropriate treatment; while at the same time it is understood that the absence of material cause for the cystitis, such as stone, stricture, vesical incompetence, &c., has been ascertained. Examples are, Cases 2, 24, 31, and 43.

The second class of cases includes those examples of prostatic hypertrophy and of atony of the bladder, in which that organ must be emptied by the catheter many times in the twenty-four hours, and in which painful chronic cystitis is obviously aggravated, if not maintained, by the necessary process of relief. These are usually cases in which the disease has existed for years, and which have arrived, to all appearance, at the latest stage, unless complete relief can be afforded. Examples are seen in Cases 5 and 34.

The third class embraces those cases, less rare perhaps than they have been supposed to be, in which the existence of impacted calculus or of adhering calculous matter may be suspected, or may be known to be present by sounding. Examples are seen in Cases 3, 4, 7, 22, and 36.

In the fourth class I place those cases in which painful and very frequent micturition or bleeding, separately or combined, may have long existed; without signs of cystitis, the urine being clear, free, or nearly so, from mucous or purulent deposit; furthermore, the cause of these symptoms has baffled the most careful inquiry. On exploration being made no organic change is discovered, no light is obtained on the diagnosis of the case, but the functions of the bladder and urethra are suspended for a week or so, and the patient gets well more or less completely. Of this remarkable history there are no less than six examples in the series: of which three, Cases 8, 14, and 35, perfectly recovered, besides three others in which great improvement took place, but not complete recovery, Cases 17, 23, and 41. The result of operation undertaken in the circumstances described, as a last, if not almost hopeless resource, has been surprising, and fraught with great interest. I am disposed to think that there are some persons in whom an attack of cystitis with extreme frequency of micturition having been set up, the want to relieve the bladder every half-hour or hour, at first natural and necessary, still continues, in spite of their efforts to overcome it, after the local disease has passed away,

as the result of what may be regarded as persistency of a morbid habit, in certain constitutions. I cannot further explain the pathological condition in any of one of them, having discovered nothing by the investigation to account for the symptoms.

Besides these, one case has been already referred to, in which adhesions between the mucous lining of the bladder were separated by the finger, Case 12; there was one case of division of the neck of the bladder, which was extremely tight and rigid, Case 41; and one case of hæmaturia in which the surface of the mucous membrane was studded with numerous minute villous papillæ, removed by scraping, followed by applications of caustic, Case 37. In each of these cases considerable improvement resulted from the proceeding; the last being completely successful.

I cannot but hope that the results reported in these histories may lead to a further employment of this simple operation in cases of like obscurity, feeling sure that much valuable relief to suffering, as well as prolongation of life, may be attained by a judicious application of the proceeding.

FORTY-TWO CASES OF OPERATION FOR DIGITAL EXPLORATION OF THE BLADDER, *performed by the Author, and briefly reported, but containing the chief points of the history, progress, and results in each. In twenty instances, Tumour of the Bladder was met with; in this series that fact only is named; the details will be found in a Table at the end of the section devoted to that subject.*

Case 1.—T. R., 29. Exploration: 1880, Nov. 6. Tumour removed. (See Table, No. 1.)

Case 2.—J. H., 48. For several years has passed blood in the urine, and occasionally phosphatic deposits, with much frequency of micturition, chronic cystitis, &c.

Exploration: 1881, June 27. Nothing found; tube remained a week for drainage; 1884, June 7; very decided improvement ever since.

Case 3.—C. J., 52. I performed lateral lithotomy in 1880, with Dr. Jas. W. J. Smith, of Belfast, for a large uric acid calculus; the wound healed slowly; subsequently passed phosphatic masses with bleeding.

Exploration: 1881, June 17. Found phosphatic deposit adhering to the walls of the bladder, and removed it with my finger; then drained the bladder for a week; some relief followed, but it was not considerable.

Case 4.—T. H., 68. A year ago a calculus removed from the bladder, by lithotomy. Soon after recovery he had hæmaturia, continuing some months in spite of treatment. He also experienced great pain, irritation, and extreme weakness, his condition occasioning great anxiety.

Exploration: 1882, Feb. 10. Nothing found except a scale of phosphatic matter, adherent to the bladder, and I removed it with my finger. He soon recovered, and never saw blood again. Was seen with me by Sir W. Jenner, 1884

July; he called on me three months ago, stating that he was enjoying better health and activity than for years past.

Case 5.—T. H., 60. Passes all urine by catheter, many times in the day; much phosphatic deposit and great suffering.

Exploration: 1882, March 20. Nothing whatever found in the bladder. I therefore introduced a tube, which remained there eleven days, thoroughly resting and draining the bladder. The relief was great; he resumed active habits, and he has been better ever since. Drs. Chepmell and Barton Smith present.

Case 6.—Mrs. F., 30. Exploration: 1882, May 9. Tumour removed. (See Table, No. 2.)

Case 7.—A. S., 72. Passes all urine by catheter, with great pain and extreme frequency; very feeble; seen in consultation with Sir W. Jenner.

Exploration: 1882, June 21. I found a small impacted calculus, and removed it with finger; bladder drained through tube; great relief to pain, but died in a few days from exhaustion. The operation was undertaken to relieve pain, and not with any view of saving life, as he was obviously near his end.

Case 8.—C. C., 83. Micturition extremely frequent and very painful, but requires the catheter only once daily, very little urine being retained, the instrument withdrawing only one ounce, and that is clear.

Exploration: 1882, June 30. Nothing found; tube retained for twelve days, after which the relief was remarkable and permanent. I have recently seen him, and he is absolutely free from symptoms.

Case 9.—B. G., 46. Exploration: 1882, Nov. 3. Tumour removed. (See Table, No. 3.)

Case 10.—M. C., 52. Exploration: 1882, Nov. 20. Tumour removed. (See Table, No. 4.)

Case 11.—F. I., 24. History of severe hæmorrhage and very painful frequent micturition. Sent to me by Dr. Iles, of Fairford, Gloucestershire.

Exploration: 1882, Dec. 15. Dr. George Johnson present. Nothing felt, except that the whole cavity of the bladder is irregular and the lining membrane thickened. Tube retained five days; on removing it, bleeding which had ceased reappeared. The wound does not heal, some urine passing by it, partially prevented by frequent catheterism.

Case 12.—Mrs. H., 23. From New Zealand, with very severe symptoms of three years' standing; said to be due to 'polypus of bladder.'

Exploration: 1882, Dec. 19. Cavity of bladder extremely small, apparently limited by adhesions, which gave way easily under pressure of the finger at some points; a condition I never observed before; no tumour. She soon recovered, lost all pain from that time, but was compelled to pass water almost as frequently as before. Her health was much improved, and she returned in the following month.

Case 13.—E. K., 67. Exploration: 1883, Jan. 17. Tumour removed. (See Table, No. 5.)

Case 14.—W. C., 52. Very frequent and painful micturition, without ascertainable cause, for a year past; rarely holds water more than half an hour. No hæmaturia.

Exploration: 1883, Jan. 22. Dr. Van Syckel, of New York, and others present.

No morbid sign discoverable. Tube retained a week. Healed quickly; being one month afterwards absolutely free from symptoms; says he was never better in his life. He returned to the Cape of Good Hope, whence he had come purposely to consult me.

Case 15.—Miss G., 30. Severe symptoms, without ascertainable cause. Long-standing hæmaturia, evidently from bladder. Health very infirm; all treatment hitherto employed has been fruitless.

Exploration: 1883, Jan. 23. Nothing found, but thickening of mucous membrane of bladder, the result of chronic cystitis. No relief except from some of her pain. She slowly sank, and died within a month. Sent to me by Dr. Myrtle, of Harrogate.

Case 16.—T. F., 67. Exploration: 1883, Jan. 30. Tumour removed. (See Table, No. 6.)

Case 17.—W. R., 44. Symptoms severe. Hæmaturia during the last year and a half; no cause ascertainable.

Exploration: 1883, Feb. 2. Dr. George Johnson present. Nothing whatever found; tube retained four days. Wound healed readily, and in the following month he left free from symptoms. Sent to me by Dr. Appleyard, of Bradford. I have recently learned that there is some return of symptoms, although much less considerable than before the operation.

Case 18.—W. W., 63. Exploration: 1883, Feb. 8. Tumour removed. (See Table, No. 7.)

Case 19.—J. M., 64. Exploration: 1883, Feb. 21. Tumour removed. (See Table, No. 8.)

Case 20.—Mrs. R., 65. Exploration: 1883, Feb. 27. Tumour removed. (See Table, No. 9.)

Case 21.—J. S., 53. Exploration: 1883, March 3. Tumour removed. (See Table, No. 10.)

Case 22.—J. F., 27. Very severe symptoms for four years without known cause.

Exploration: 1883, March 12. I found the upper part of bladder coated with thin phosphatic deposit; and detached a quantity which proved to be thin flocculent membrane with adhering phosphates, and was scraped off with my finger-nail, when it became free in the bladder, and was removed with the forceps. I at first supposed it to be a slender villous growth. It was examined by Mr. Eve, who described it as above. Tube was retained one day; the wound did not heal; he had orchitis, and suffered much for a long time; ultimately there was some improvement.

Case 23.—R. B., 50. Severely painful and frequent micturition during last two and a half years; passes urine every hour, day and night; occasionally blood, worse for movements. No cause being discovered, exploration was made 1883, March 15, with his medical attendant, Mr. J. Hartley, Malton, Yorkshire. Nothing was found but roughness of the mucous membrane, not considerable in places. No fever, not much bleeding; tube taken out on third day, gradual improvement, left in the middle of April much relieved. June, 1884. Continues to be troubled with undue frequency, and a little pain, but much less than formerly. Health good, and habits active.

Case 24.—C. L., 62. In 1880, October. Lithotrity for small uric acid calculus single sitting; a brief operation, without any difficulty, but followed by severe cystitis; becoming chronic, and attended with much phosphatic deposit; this condition continued in spite of treatment during 1881 and 1882, phosphatic concretions being occasionally removed by lithotrite. In the beginning of 1883 the symptoms were more severe than ever; urine muco-purulent and bloody, and no cause ascertained.

Exploration: 1883, March 21, with Sir A. Clark. On the right side of the prostate a firm growth, size of a chestnut with broad base, protrudes into the bladder. Decided not to touch it, but drained the bladder for some days. In the middle of April the wound healed, and a little improvement, certainly not much, has been experienced since.

Case 25.—W. D., 65. Exploration: 1883, March 30. Tumour. (See Table, No. 11.)

Case 26.—J. C. D., 43.—Pain, frequency and repeated attacks of hæmaturia, more or less during five years; symptoms now severe, without ascertainable cause.

Exploration: 1883, April 4. Dr. Stockton, of New York, present. Found nothing but very notable roughness at the top of the bladder, like phosphatic incrustation, but on attempting to remove it with finger-nail found it was an altered condition of mucous membrane, as if a congeries of varicose vessels with thickened walls; placed a tube in the wound. On the fifth day signs of pyæmia appeared, and he died on the 16th; no autopsy permitted.

Case 27.—C. C. S., 56. Exploration: 1883, May 4. Tumour removed. (See Table, No. 12.)

Case 28.—T. Q., 52. Exploration: 1883, May 9. Tumour removed. (See Table, No. 13.)

Case 29.—A. G. S. C., 57. Exploration: 1883, June 27. Tumour removed. (See Table, No. 14.)

Case 30.—H. B., 23. During last two years, subject to pain, frequency and slight hæmaturia, little influenced by treatment, and associated with other symptoms of an anomalous kind; much care was bestowed on the case, and no explanation of it was discovered.

Exploration: 1883, June 28, with Dr. Walker, of Lowestoft. Nothing whatever found; tube retained eight days. The wound healed, and he left in a month with less frequency of micturition, but with constant pain in the penis, and apparently little benefited by the operation.

Case 31.—R. W. C., 52. Had been cut for a large stone in May 1882 by Dr. George Buchanan, of Glasgow. Wound healed rapidly. After this, great pain and frequency of micturition, not relieved by treatment.

1883, June 23. Passes water every twenty minutes, night and day; worse for movement; phosphatic deposits and blood in the urine; nothing discovered by sounding; empties his bladder perfectly. I thought it not unlikely that some calculus might be impacted or sacculated, and decided to explore.

Exploration: June 29. Dr. Walker, of Lowestoft, present. Nothing found. Retained tube eight days. He had much subsequent treatment for the bladder, and he left in about six weeks, retaining urine about an hour, instead of twenty minutes, a very slight improvement.

Case 32.—J. H. B., 40. Exploration: 1883, July 7. Tumour removed. (See Table, No. 15.)

Case 33.—T. S., 42. Exploration: 1883, November 16. Tumour removed. (See Table, No. 16.)

Case 34.—H. N., 68; October, 1882. Last four years much difficulty and pain in passing water; of late increasing. Now passes water about every hour, day and night. Catheter passed forty ounces of retained urine; learned to use the catheter. Seen with Dr. Barker, of Finsbury Park.

1883, November, greatly relieved by catheterism for several months, but soon felt pain when the bladder was empty. Sounded; phosphatic calculus found, and removed at one sitting. Relief at first; subsequently increased pain and frequency; all urine passes by catheter. Decided to explore the bladder, and did so December 11. Nothing was found, but the bladder very rugose, and the walls thickened by disease; it was drained for ten days, with relief. Wound soon healed, and he left on the 28th, not much benefited. Not long afterwards he died, worn out by suffering.

Case 35.—C. H. C., 25. In 1881, Feb., he first consulted me for attacks of hæmaturia, commencing two years ago after severe exercise. Blood appears chiefly at the end of micturition; always after exercise or standing. Nothing found by sounding; the symptoms strongly indicate tumour, although no débris is found after repeated examinations of the urine.

During 1883 lived chiefly on board his yacht, and then rarely saw blood; but this still appears freely after exertion.

1884, Jan. 23. Exploration of the bladder: Dr. Geo. Johnson and Mr. Bryant present. No tumour found; no organic change detected; retained tube nine days. There was no fever; health excellent; wound healed by February 6. In the middle of the month he began to walk, and did so for two hours a day during the third week, without any bleeding. July 1884; he is now perfectly well; free from all symptoms.

Case 36.—Mrs. W., 44. 1884, Jan. For a year and a quarter micturition has been very frequent and painful, becoming worse of late. Has had much treatment, but the cause of her symptoms is obscure. Jan. 26, 1884. Explored the bladder, after dilating the urethra, with Dr. John Smith, of Dumfries, who brought the patient up. Found springing from the centre of the trigone a hard prominence, externally consisting of some soft structure; internally there was evidently a hard one. The outer layer was scratched through, a hard calculus was disclosed and enucleated; it was about the size of an acorn.

She had long-continued fever with much exhaustion during almost a month, but gradually recovered, and returned completely relieved from her urinary troubles, and is now quite well.

Case 37.—H. F., 58. He first consulted me in 1879 for recurring hæmaturia, to which he had already been subject three years. I saw him from time to time, and, finding no clue to the cause, explored the bladder, 1884, Jan. 30. Mr. Henry Morris was present. Extremely good examples of villous growth had been found in the urine when examined under the microscope.

At the operation no tumour was found, but numerous small papillæ were felt affecting the upper surface and sides of the bladder. These were dealt with by scraping with the finger-nail, and by subsequent injections of caustic. He made a good recovery, and on Feb. 20 the wound was quite healed; he was walking out;

no frequency, pain, nor bleeding present. I have just seen him, June 5; he was walking four miles daily without any of his former symptoms.

Case 38.—B., aged 50. Exploration: 1884, Feb. 5. Tumour partially removed. (See Table, No. 17.)

Case 39.—W. G., aged 69. Exploration: 1884, Mar. 12. Tumour found. (See Table, No. 18.)

Case 40.—F. J. O., aged 58. Exploration: 1884, April 4. Tumour found. (See Table, No. 19.)

Case 41.—M. W. B., aged 45. Many years painful symptoms, and treatment for alleged stricture, which does not exist. During last twelve months great frequency of micturition: now every half-hour, night and day. Instruments have been passed by himself and others up to the neck of the bladder, and then fail to enter. Examination shows that the neck of the bladder is distinctly tense, rigid on the lower aspect, but the short-beaked sound passes over it readily into the bladder; nevertheless, there is no stricture, for No. 15 (English) will enter.

1884, April 14. Exploration. The finger on entering the bladder encountered rugæ and a roughened surface of mucous membrane, especially at upper part of bladder. The neck of the bladder was exceedingly tight, grasping the end of the finger like a ring; I divided this at the lower border so that the tension ceased. Free bleeding followed. A tube was tied in four or five days. He recovered slowly, and gradually regained power to retain his urine, the intervals being from two to three hours in the middle of May—a condition for which he was extremely grateful. He takes outdoor exercise, and is in no degree worse for it.

Case 42.—R. S. R., aged 63. Exploration: 1884, May 30. Tumour found and removed. (See Table, No. 20.)

Case 43.—W. K. E., aged 66. Severe symptoms for some time; prostate very large and irregular. I found a phosphatic calculus, and removed it May 19, 1884, but very little relief followed, in spite of daily injections, and much treatment of various kinds. He requires frequent catheterism, but the intervals are very short, and his suffering increased during the first week in June, and I decided to explore the bladder, and did so on June 12. No fragments of calculus had been left, but I found prostatic outgrowth forming a salient ridge, broad, and overlapping the base and sides of the internal meatus; tied in a tube, and exchanged it for a soft catheter next day. Great relief followed; he retained the tube eleven days, and after its withdrawal held his water two to three hours. June 28: he has not had such rest at night for several months, and the urine, which was highly offensive, and loaded with muco-pus, is now comparatively clear. July 10: he returns to the country almost well—better than I ever expected to see him. Sent to me by Dr. Sawyer, of Birmingham.

LECTURE III.

TUMOURS OF THE BLADDER.

It is a fact which now begins to appear somewhat surprising, that, until a very recent period, the subject of tumours of the bladder has received a comparatively small share of attention, either from pathologists or from practical surgeons. The former have noticed these morbid products, chiefly to remark on their rarity; the latter have alluded to them chiefly as, for the most part, beyond the power of art to remove. The literature relating to them is slender, and inasmuch as, with few exceptions, its earlier records treat the familiar outgrowths from the prostate, and the rarer neoplasms which arise from the bladder, without distinguishing between them, not much is available for our purpose.

More than one attempt has been made of late to collect all the cases which may be hunted up among old authors, with the laudable view of collecting information on a subject so lately fraught with new interest, but the result is not successful. The material which has thus been apparently gained as regards quantity by somewhat indiscriminately sweeping the dusty pages of old surgical writers, in the keen search for any semblance of a vesical tumour, is found to possess little value, from the uncertain quality of the produce so gathered. The only object worth attaining by antiquarian research is the discovery of undoubted examples of true vesical growths, and of some important facts respecting them, and not the production of a list, the extent of which suggests erudition, but is due to a miscellaneous collection of records embracing mere prostatic outgrowths on the one hand, and cancerous formations on the other, indiscriminately mixed with all the varied products which lie between them.

Carefully eliminating obviously useless matter, I will give a brief historical epitome of the few unquestionable operations made for the purpose of removing recognised tumours of the bladder, with a view of showing what surgery has hitherto done in the way of removing them.

There is no doubt that Covillard, of Lyons, performed the lateral operation for a vesical tumour proper, in the year 1639, having previously diagnosed, by sounding, the presence of '*un corps dur et solide*,' not a stone. He describes how he crushed it with the forceps, destroying and removing it, and records that the patient recovered.[1] The occurrence of flocculent, sprouting growths, as well as of more solid growths, from the neck of the bladder (prostatic), was well known to the older surgeons. Le Cat refers to them, and to some observations made respecting them by Ruysch, Houstet, Le Dran, and others.[2] In the end of the last century, Deschamps, Boyer, Guérin (père), and Desault, besides others, refer to vesical outgrowths, but Chopart offers the best description of them under the head of 'Fungus of the Bladder' in his classical work, and here vascular papilloma is distinctly described as differing from the malignant and other forms.[3] Furthermore, he relates the case in which Desault, towards the close of the last century, recognised a pedunculated growth of considerable size in the bladder of a patient, as he was cutting for the stone in Hôtel-Dieu; and relates that, after removing it, he twisted off the tumour with the lithotomy forceps, and that the patient made a good recovery.[4] Then, very early in the present century, A. Petit, of Lyons, operating on a man aged 28, supposed to have the stone, found a large tumour, which, after consultation, was left untouched. The patient recovered from the operation, but returned to the hospital after a year to die, and at the autopsy the tumour was found to be of the size of a fist, and attached by a small pedicle which might have been easily divided.[5]

The next definite record is by Civiale, who refers to three instances in which, subsequently to 1827, he removed small growths from the bladder evidently unimportant in size, with his original 'trilabe,' when crushing the stone, without any bad results. He also describes a similar operation on a fourth, much larger, the

[1] *Le Chirurgien opérateur : avec des observ. iatrochirurgiques*, par Joseph Covillard. 8vo. Lyons, 1640.

[2] *Parallèle de la taille latérale.* Amsterdam, 1766, pp. 244–61.

[3] *Traité des maladies des voies urinaires*, par Chopart. A posthumous edition, edited by Felix Pascal. Paris, 1830; vol. ii. pp. 74–79. Chopart and Desault both died in 1795.

[4] *Idem*, vol. ii. p. 97.

[5] *Dict. des Sciences Médicales*, vol. xliv. pp. 232–33. Article 'Polype,' by Vaidy. Paris, 1820.

result of which was unsuccessful; and another case in Hôpital Neckar, treated in the same manner, in 1834, with good result, adding that he has crushed other small ones with the lithotrite.[1] The nature of these operations necessarily precluded intelligent observation, or the acquisition of information respecting the growths themselves; and very little, if anything, is known of the ultimate history of the patients.

In 1834, Crosse, of Norwich, operated on a boy with severe symptoms of calculus, by the lateral operation, although on sounding he could find none, but several small tumours protruded from the wound, some of which he removed. The boy died in 48 hours, and a number of these growths was found in the bladder. The preparation is No. 2000 in our museum here.[2]

In 1874 Billroth, of Vienna, did the lateral operation on a boy of twelve to remove a tumour, a 'myosarcoma' of large size; finding the opening insufficient, he performed the supra-pubic operation and extracted it there. The boy made a good recovery.[3]

In the same year, Volkmann, of Halle, did the supra-pubic operation for a man aged 54, removing a large myomatous growth, with a small pedicle only half an inch long, the patient dying of infiltration and peritonitis on the third day.[4]

Professor Kocher, of Berne, performed Nélaton's pre-rectal lithotomy, December 31, 1874, for a man aged 38, for the removal of a papilloma. The man was reported well one and a quarter years afterwards.[5]

At Addenbrooke's Hospital, Cambridge, Professor Murray Humphry did lateral lithotomy, October 17, 1877, for a man aged 21, removing a large tumour completely, the man recovering.[6]

Supra-pubic lithotomy was done by Marcacci on a man aged 54, for vesical tumour in 1880. It was villous on the surface, but it was stated to be a 'spindle-celled sarcoma' throughout. He lived two months, dying of extravasation and peritonitis.[7]

Berkeley Hill performed lateral lithotomy at University College

[1] *Traité pratique*, vol. iii. pp. 152–61. Paris, 1860.

[2] *Treatise on Calculus.* By J. G. Crosse, Surgeon to the Norfolk and Norwich Hospital. Plate xx. fig. 2, p. 124. London, 1835.

[3] *Archiv für klinische Chirurgie*, Band xviii. 1875.

[4] *Archiv für klinische Chirurgie*, Band xix. p. 682. 1876.

[5] *Centralblatt für Chirurgie*, April 1, 1876.

[6] *Medico-Chirurg. Trans.* vol. lxii. pp. 421–27. 1879.

[7] *Lo Sperimentale*, Oct. 1880; *London Medical Record*, Dec. 1880.

Hospital in 1880, removing a portion of an epithelioma, in a man aged 63, who died two days after.[1]

Davies Colley, of Guy's Hospital, performed lateral lithotomy in April, 1880, for a man aged 32, drawing out a long villous growth, and cutting it off with a pair of scissors close to the wall of the bladder.[2] Mr. Colley has just written me (May 1, 1884) that the man is at this time perfectly well, and has followed his occupation—that of a shipwright—ever since.

The first case in which I myself removed a tumour by operation was that of a man aged 29, on whom I did the median operation, November 6, 1880. I found a polypoid growth, and removed the whole of it with a pair of forceps, twisting it off at the base of the pedicle. He made a rapid recovery, and is living and well at the present time.[3]

My subsequent cases—nineteen in number—seventeen in males as well as two in females, all the former having been discovered by digital exploration of the bladder, and treated by the limited perineal incision I have employed for that purpose—will be furnished in a table to be considered presently.

Mr. Whitehead, of Manchester, has adopted this method of treatment, and employed it with considerable success. He has recently, in conjunction with Dr. Pollard, published six cases of operation for vesical tumour, four in the male, and two in the female. In two of the former a very favourable condition of the patient is reported nearly twelve months after operation, and the female cases, more recent, were well at the date of the report.[4]

Certain other cases found recorded in the journals have been quoted by recent writers as examples of operation for vesical tumour, but are intentionally omitted here, since the operations in question have either failed entirely or partially to remove the tumour, or no such body has been present.[5]

It is also unnecessary to refer further to the history of opera-

[1] Report of Surgical Registrar, Mr. Stanley Boyd, 1880, p. 33. Harrison, London, 1881.

[2] *Clin. Soc. Trans.* vol. xiv. p. 104. 1881.

[3] *Trans. Med Chir.* vol. lxv. 1882.

[4] *The Surgical Treatment of Tumours, &c.*, by W. Whitehead and Dr. P. Pollard (London: Churchill, 1883); containing much interesting matter, and valuable information on the subject.

[5] Thus Gersuny, Billroth's assistant at Vienna, performed the median operation in the winter of 1870-1, to remove a broken piece of catheter, and discovered a tumour, which could not be removed, and no attempt was therefore made. The patient died

tions for vesical growths in the female, since they have been long recognised as accessible to examination, and amenable to surgical treatment without much difficulty. The well-known case by Surgeon Warner, of Guy's Hospital, in the former half of last century, occurred in a woman aged 24. He divided the neck of the bladder and ligatured a large polypoid tumour with a successful result.[1]

From the numerous well-known facts of a similar kind, and from the short list of operations on the male above recorded, it is quite certain that a considerable proportion of vesical tumours are removable, and that when completely or almost completely removed they often do not reappear. That is all which we gain from the study of the slender experience of the past; and, so far as it goes, it is not without value.

But there is another mode of studying the subject which has not been pursued to any great extent, and which, nevertheless, is fraught with greater promise; a mode, indeed, which it is only possible to pursue on an extensive scale in this country, since here only the requisite materials are to be found—I mean the study of the vesical tumours themselves, with their physical characters exposed to view, as found in the various museums of our metropolis, together with, in many instances, a few important facts relating to the character and history of those who were the subjects of the disease. It is among these important collections that we find the originals of those drawings which have served to familiarise the student, both here and abroad, with delineations of disease which they are rarely able to see or dissect. Here are the very organs which were engraved for the works of Baillie, Hunter, Bell, Home, Crosse, and others, and from which Civiale selected his subjects to illustrate the 'Traité pratique' in connection with this topic.[2]

Of growths or tumours arising from the inner surface of the bladder, and pursuing an independent development within the cavity, there were in the metropolitan museums, prior to 1882, about fifty examples preserved in spirit.

six days after, and the tumour was found at the autopsy in a recess at the back of the bladder. But clearly this is not an operation for tumour. (*Archiv für klinische Chirurgie*, Band xiii. p. 131. 1871.)

[1] *Cases in Surgery*, by Joseph Warner, F.R.S., Surgeon to Guy's Hospital (London, 1750; and *Philosoph. Trans.* vol. xliv.

[2] *Traité pratique*, vol iii. pp. 107 *et seq.*, figs. 9–15. Paris, 1860.

Forty-three of these were from adults of various ages; eight had occurred in young children. A large majority of the former or adult series had arisen in male patients; but as in a few preparations the sex is uncertain, no exact statement can be made. Of the eight children, six were female. In addition to these fifty cases there is about an equal number of growths and infiltrations preserved in the same museums, which are probably cancerous, and respecting which there is little more to be said. Returning to the non-cancerous growths, it may be stated that, in respect of physical conformation, a considerable proportion of them consist of a single growth from the walls of the bladder, more or less pedunculated, and might obviously have been removed by operation without difficulty. Others are broad and sessile, developed into two or more lobes; and much more rarely there are two or more independent growths in the same bladder. Then some are delicate, soft, filamentous or fimbriated in structure; while others are firm and solid; much variety of density is to be met with among different specimens in the fresh state, as my own cases have led me to observe.

In relation to the question of situation, it does not appear that any part of the bladder can be regarded as a particularly favourite spot for their origin; the orifices of the ureters, for example, as is stated by some. The lower half of the bladder is more frequently affected than the upper; and I think that is the only distinct statement relating to locality which can be made.

FIG. 6.—Two growths, probably fibro-papilloma. From preparation No. 2006, Royal College of Surgeons.

I have selected several of the most typical varieties and have made drawings from them which have been engraved in order to illustrate the subject of size, contour, and number, so important in relation to questions of surgical treatment, hereafter to be considered (see figs. 6, 7, 8, 9, 10, and also 3).

Next to the preserved examples may be considered the result of my own experience, derived from exploring the bladder, in the

manner described in the preceding lecture. By means of this operation I have already encountered no less than twenty cases of vesical tumour. I have presented an account of them in a tabular form, which shows at a glance the following particulars: the age of the patient, the date of operation, the duration of symptoms up to that period, what was the earliest symptom observed, the result of examination of the urine before operation, the nature of the operation itself, the form and situation of the tumour, its structural elements after examination, and the after results to the present time. (See page 72.)

FIG. 7.—From a man aged 59. The tumour, which was of rapid growth, springs from a narrow base. As here seen, it fills the bladder, is chiefly solid, but covered with fimbriated papilloma. From prep. No. 2004, Museum, Royal College of Surgeons. A very similar preparation may be seen at University College Museum, No. 1475.

In some cases I have, as far as the sense of touch has enabled me to judge, removed the entire growth, and when unable to do so have taken away as much of it as possible; pruning, so to speak, the most salient portions, when the growth was inseparable from the walls of the bladder, a condition met with in several cases. In all instances, however, I have been very careful to examine the growth so minutely with the finger before operating, as to be able to offer a diagrammatic representation of its size and form. In each one of these cases I made a sketch at the time, representing to the best of my ability, the impression thus obtained of the contour and situation of the growth in relation to the vesical cavity. These are reproduced here in order to illustrate each case when referred to; and thus fresh information in regard of the conditions likely to be met with in such cases has been

FIG. 8.—Firm polypoid growths, each with very narrow peduncle. Bladder everted to show them; no papillæ present. From Museum of Guy's Hospital, No. 2104 [24].

obtained. I think in general terms it may be affirmed that a single tumour attached by a narrow pedicle to the wall of the bladder, and therefore resembling more or less the outline of a fig, is not very common, and to say that it may occur once in six or seven cases of non-malignant tumour probably approaches a correct numerical estimate. On the other hand, sessile growths, of which the base is perhaps the widest part, are met with, perhaps quite as frequently as the pedunculated form just described; and then there are intermediate forms of every grade between the two, the preponderance in number perhaps being among the non-pedunculated class.

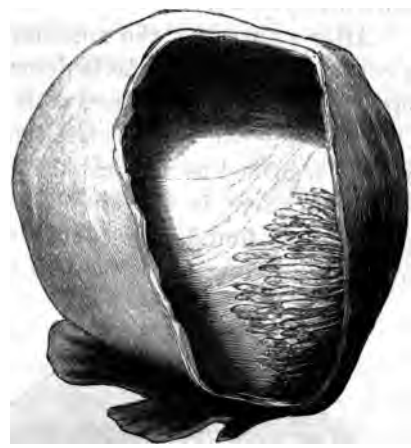


FIG. 9.—Fimbriated papilloma ('villous'). From Museum of Royal College of Surgeons, No. 2005.

STRUCTURE.—We now come to structural characters. Hitherto, most of the statements relative to vesical growths have been somewhat vague, since materials for observation have not been attainable. Thus, it has been customary to regard villous growths as a class; and these were at no very remote period termed 'villous cancer.' The existence of papilloma has been generally recognised; occasionally sarcomatous growths have been spoken of, although probably without intention to convey the meaning which modern pathology attaches to the term. After that, follow epithelioma and cancer. Then occasionally, but rarely, an isolated specimen has appeared at the Pathological Society of London, and has been subjected to a minute examination, but the total of these specimens has not afforded data for making any classification. Neither at present is it possible to form a complete generalisation, but valuable indications have been attained from the twenty cases now brought before you, which constitute a sufficient number of important facts to commence with. Every one of the tumours I have dealt with, including the few which have not been removed (since I have invariably taken away a portion sufficiently large for complete histological examination), has been carefully treated by a com-

petent observer: at first by Mr. Stanley Boyd, with one or two by Mr. Eve, and others by Mr. Shattock; while all the later ones (fourteen in number) have been laboriously investigated for me by Dr. Heneage Gibbes, from whom I have received in every instance a full written report on intimate structure and several microscopic preparations, some of which furnished the originals of some very accurate and beautiful drawings, by Mr. T. P. Collings, now presented to you here.

After a survey of the museum specimens on the one hand, and a consideration of the facts determined by histological analysis of my own cases on the other, with Dr. Heneage Gibbes, I have made the following attempt at classifying these products, and I think it will be regarded as warranted by the evidence.

First, there is the simple mucous polypus which I have at present only found in the bladder of children, and in their cases only among the preparations in the museums referred to—some of which appear to be analogous in structure to the soft nasal polypus, a form of myxoma, while other specimens appear to contain, in addition, more of the deeper normal fibres of the structures from which the growth arises. In the specimens referred to, of which one was engraved in Crosse's work, and another is presented here (fig. 10), the growths are numerous, evidently rapidly formed, soon fill the bladder, and in the case of female children sometimes issue by the external meatus, and present in the vagina.[1]

FIG. 10.—Polypoid growths (myxoma), from a child 1½ year old, under Mr. Marshall at University College Hospital. Museum, No. 1471, E.

The operators have described the first-named kind when fresh as soft, gelatinous, and translucent; conditions which are lost in the preparation by immersion in spirit.

[1] One example of polypoid growths in a child is given in Dr. M. Baillie's series of engravings illustrating the morbid anatomy of the human body, &c. (London, 1799, fasc. vii. vol. iv. fig. 2, p. 151). This is now Prep. No. 1999 R.C.S. Museum. Crosse's example is shown at pl. xx. fig. 2 of the *Treatise on Calculus* (London, 1835), and is Prep. No. 2000 in the same museum. Three other specimens are in Guy's Hospital

In all but one of the eight cases in the museums the age was two years or less, and in the exception was five years only. It is not unlikely that some of these may be congenital, while the structure shows them to be composed of embryonic elements. I have never met with anything of this kind in the adult bladder.

Two of the more recent specimens have been carefully examined and reported on at the Pathological Society, and are referred to in the note below, forming in fact the two specimens last on the list there given. One, examined by Mr. Butlin and Mr. Beck, was 'found to be composed almost entirely of small round cells of a lymphoid type imbedded in a basis, homogeneous or nearly so on the surface, but becoming more and more fibrous towards the pedicle, until at the base the fibrous tissue forms the bulk of the growth, the cells being only scattered here and there, either singly or in groups.' The other, examined by Mr. Shattock, is described as displaying 'oval and more elongated cells lying in an abundant intercellular substance, either albuminous or mucous, and scantily traversed by fibres; no stellate cells are present.'

In regard to the cases of vesical tumour in which I have myself operated, they fall naturally, as do those of other regions, into two distinct categories; namely, those which consist only of elements identical with the normal tissues of the bladder, 'homœoplastic,' and those which consist, more or less, of other elements never found in the tissues of the healthy bladder, or 'heteroplastic.'

The first category offers at least three forms of growth, but passing insensibly from one to the other, being apparently diverse developments of the same structural change. Two of them may be spoken of as papilloma, which appears in two typical forms. Before describing them I shall show you a representation of healthy vesical mucous membrane in order to compare the epithelium and its underlying tissues in the bladder with the analogous tissues in papilloma. It is a drawing from a very successful microscopic section made immediately after death from the emptied bladder of an ape by Dr. Gibbes. It shows a minute

Museum; one a girl aged five years—No. 2104[30]—described by Mr. Birkett in *Trans. Med. Chir. Soc.* vol. xli. p. 311; another, 2104[32]; and a boy, No. 2104[31].

One is in St. Bartholomew's Museum, 2419, described in *Path. Soc. Trans.* vol. iii. p. 127; one in St. Thomas's, B B 28; and one in University College, 1471 E, carefully described in *Path. Trans.* vol. xxxiv. pp. 150-1—by Mr. S. G. Shattock. An interesting case is reported by Mr. Howard Marsh in the *Path. Soc. Trans.* vol. xxv. pp. 178-80, carefully examined by Mr. Butlin and by Mr. M. Beck.

fold of the mucous membrane, resulting from that duplicature of it which takes place when the bladder is contracted. And thus it has, in this temporary condition, a strong resemblance to the permanent form which a single papilla exhibits when papillomatous growth is present in the bladder.

1. *Fimbriated Papilloma.*—I employ this term to designate that product which has been familiarly known as the 'villous' growth, which is admitted to be objectionable on several grounds. The most obvious character of the growth is a structure in which the vesical mucous membrane is developed into fine papillæ, which consist of long fimbriated processes of extreme tenuity, and usually form a group arising from a small circumscribed base. This last-named part contains other and more solid structure than that which enters into the papillæ themselves. Sometimes the processes are almost single thread-like forms, arranged side by side, and undivided for a considerable distance; others are bifid, generally more compound still; some may be described as digitate, and occasionally the processes radiate and suggest forms resembling those of leaves. Immersed in fluid, the long fimbriated growths float out like slender-leaved aquatic plants in deep water; and when removed to air, collapse and form a soft mass resembling a small strawberry. Usually one only is found in a bladder; sometimes there are two or three (see fig. 6), and sometimes minute growths of the same kind may be found affecting, more or less, the lining membrane of the cavity. The microscopic structure, which has been often well described,[1] may be given briefly as follows: 'Each of these delicate villi consists of a connective-tissue groundwork, covered by layers of columnar cells, resting on a fine basilar membrane, and exactly resembling those of the normal bladder. In the deeper part there are bands of non-striped muscle. These bands do not run into the papillæ, only two or three isolated fibres enter their bases. The growth is well supplied with blood-vessels; capillaries running up and into the villi, and branching directly under the basement membrane. They are large, and have very delicate walls' (Dr. H. Gibbes). The case of T. H. B., aged 40, case No. 15, is the best example of the series,

[1] Examples of these have been presented to the Pathological Society of London by several observers; among them by myself as early as 1856. *Vide* vol. v. p. 200, and vol. vi. pp. 213–4, both relating to the same case. Another, vol. vii. pp. 256–7. Also vol. viii. pp. 262–4; vol. xi. pp. 153–5; vol. xviii. pp. 176–8; vol. xxi. pp. 239–44 and 265–6; vol. xxxiii. p. 220; vol. xxxiv. pp. 157–60.

in the table of twenty cases, each illustrated by a diagram, placed at the end of this lecture.

2. *Fibro-Papilloma.*—I prefer this term to that of 'Ordinary papilloma' as first suggested, because it more correctly indicates the difference between the structure now in question and that described as 'fimbriated.' Thus in 'fibro-papilloma,' the papillary processes, although present in more or less abundance, do not constitute the chief part of the structure, which is accordingly more solid, consisting of the constituents, unstriped muscle, and connective-tissue fibres of the submucous tissues of the vesical coats. The papillæ are sometimes shorter, less developed than the 'fimbriated' processes of the previous division. The microscopical report of the solid part or groundwork of the tumour in a typical case is as follows: 'Here there is a distinct outgrowth from the wall of the bladder, of trabeculæ composed for the most part of non-striped muscle tissue. From these trabeculæ arise secondary trabeculæ, into which the non-striped muscle tissue is continued in varying amount, according to their size. The growth is covered with layers of columnar epithelial cells, exactly similar to those of the normal bladder.' Of this class the case of Dr. MacC., No. 4 in the Table, is one of the best examples.

It may be remarked here that the mere presence of papillæ on a tumour, whether met with in the simple form which has been just referred to, or when assuming the long fimbriated form previously described, does not serve in any way to identify or characterise a growth, since such papillæ may be met with springing from the surface of heteroplastic growths, as epithelioma and cancer.

3. Tumours of a Transitional Type.—The third type above referred to, although related with the preceding, inasmuch as the basic structures are still homologous with those of the bladder, appears to be best indicated by using the term 'transitional' to describe it, as perhaps occupying a place between papilloma and a formation of malignant type, sarcoma. Thus there is not only a peculiarity in the arrangement of the basic fibres, but the presence of certain cells foreign to the structure itself is observed—a fact of importance.

Dr. Heneage Gibbes describes these tumours as 'characterised by a dense fibrous groundwork of very irregular growth; and by the presence in this groundwork of variously shaped cells, gene-

rally arranged in definite groups. In some they are small round cells, in others large irregularly shaped cells with nuclei. In some of these tumours there are in parts short, thick papillæ: in other places there are no papillæ, but in all cases the surface is covered by columnar epithelial cells, resembling those of the normal bladder. The one feature which differentiates them from the two preceding forms is the arrangement of the ground substance, and the presence in it of the irregularly shaped cells, which do not belong to normal tissue on the one hand, or to distinct new growth on the other.' These characters excite suspicion as to the issue of the growth. The cases of C. C. S., No. 12, and T. S., No. 16, of the table, are examples of this group.

The second category of growths, the characteristic of which is heteroplastic structure, is illustrated in the bladder by epithelioma, and perhaps—but if so, certainly in rare instances—by the sarcomata: between which latter and the papillomata a relation has been suggested in the last noticed growth of the previous category, through the presence of certain cells above described.

One example of epithelioma was met with in my series, namely, Case 6. It will be unnecessary to enter on any description of this product, the microscopic characters of which are familiar to us all. The existence of true sarcoma of the bladder has been affirmed,[1] but not on the observation of fresh specimens. The presence of leucocytes, or of other cells, both round and spindle-shaped, liable to be found in abundance after inflammatory action in the growth, or as seen in the transitional form described, has perhaps led some observers to pronounce such structures to be sarcoma. Before long it is not improbable that some unquestionable example will be met with and identified.

Scirrhus undoubtedly occurs as a deposit in the walls of the bladder, and usually affects the base and sides sufficiently to admit of identification by rectal examination. The hard, unyielding, irregular, knotty outline presented there to the finger is so characteristic as to make its presence easily recognised.

Cancer of an encephaloid type is sometimes met with, but it is difficult at present to say how often it affects the adult bladder; it is probably not common in that situation. It is interesting to observe that there is one preserved example of melanotic growth, a very small one, affecting the bladder. It is in the Museum of

[1] *Path. Trans.* vol. xxxiv. p. 157.

Guy's Hospital, No. 2104[20], and was found at the autopsy of a man aged thirty-two, who had been a patient with melanotic disease of the eyeball, and with similar deposits in various other parts of the body.

Finally, that rare product, dermoid tumour, is occasionally found in the bladder. The contents of dermoid cysts, it is well known, are sometimes expelled, probably from an ovarian source, through the urinary passages. But in one case, which occurred in the practice of my friend Mr. T. Bryant, and which I had the pleasure of seeing with him, the locality of a dermoid tumour was undoubtedly vesical. It occurred in a married lady, aged thirty, whose first symptoms were those of cystitis, with the appearance in the urine of long hairs coated with phosphates, considerable quantities of which were from time to time removed from the bladder. Subsequently digital exploration was made, a pedunculated tumour discovered, and completely removed in two operations. It was composed of a thick layer of true skin, with much fibrous matter, interspersed with sebaceous glands and hair follicles. Altogether it much resembled in form and size an ordinary, rather large, button mushroom. The patient is now absolutely free from all symptoms.

It may be now fairly inferred that the commonest species of tumour affecting the adult bladder are papilloma, occurring in two forms—the fimbriated in tufts of elongated papillæ, and the fibro-papilloma, more solid, largely composed of the ordinary submucous tissues forming the vesical coats—all homœoplastic in character. A third product, more or less resembling the latter in its fibrous constituents, but exhibiting the presence of cells, doubtful in character, sometimes perhaps due merely to inflammatory action, while it excites suspicion as to its tendency, cannot be altogether removed from the homœoplastic group, and, as before said, is provisionally termed 'transitional.' The papillomata have certainly no malignant tendencies, but their disposition to increase and fill the cavity of the bladder, and thus to disintegrate at their periphery, together with their vascularity and consequent strong disposition to bleed largely, render them sooner or later invariably fatal.

About ten or eleven cases of my own series certainly belong to the papillomatous group; about five may be regarded as of the 'transitional' type. Collating the accounts given, and the

phenomena manifested by these patients, the general symptoms may be described as follows:—

The earliest symptom is mostly hæmorrhage. It is observed before unduly frequent micturition is complained of, and before it is painful. On the other hand, in most of the cases in which the tumour was of the malignant type or approached thereto, pain and frequency of passing water generally preceded the appearance of blood, sometimes for a considerable period of time. In almost all cases symptoms had been noted during at least three years before the patient applied to me; in some as much as six or seven years. When the growth consists chiefly of delicate filiform papillæ, the bleeding is more continuous and free than in 'fibro-papilloma,' or in the 'transitional' forms where the structure is more solid, and where the fimbriated processes may be altogether absent, or but little developed. There appears to be nothing particularly characteristic in the nature of the hæmorrhage, excepting the one important circumstance always to be inquired for, and which ought, if possible, to be observed by the surgeon himself; namely, that in the act of micturition the stream may sometimes commence without any blood stain, or with only a slight admixture, and end of a bright red colour from the presence of much fresh blood. With such an occurrence, and no recent urethral lesion having been made, the source of hæmorrhage must always be vesical. Supposing in such circumstances that the absence of stricture, ordinary diseases of the prostate, calculus of the bladder, and cancer have been ascertained by sounding and by rectal examination, it remains only to observe certain products which the urine itself may contain.

I should first say, that little positive evidence is obtained by the rectal and vesical examinations just referred to, in relation to any other growth than the hard, cancerous deposits, which are usually easy enough to identify. The result is generally negative, or nearly so, when a growth of the papillomatous or of the allied variety is present. The only positive physical sign thus attainable which I have met with, and this in a few cases only, has been the sense of slight obstruction to the free movement of the sound on one or the other side of the bladder; in others merely 'a soft feel,' as I have termed it in my notes, as if one were moving the sound in a thicker medium than urine, and without so defined a limit as is presented by the healthy vesical

walls. Then, when examining by rectum, a soft rounded fulness is sometimes to be felt when the finger can be passed beyond the prostate to the base of the bladder, but nothing that is in the least degree definite or distinct.

I have made a practice of fully examining the bladder with a sound, and the rectum by means of the finger, while the patient is under the influence of ether on the operating table, prior to performing digital exploration; nevertheless, such are the conclusions I am compelled to come to in relation to sounding for tumour.

The examination of the urine, however, is highly important, and is often very significant. Its object is to obtain disintegrated portions of the tumour, if present, and to identify their structure under the microscope. It may be necessary to examine several specimens in order to obtain indubitable evidence on this point. An excellent way of obtaining such specimens is to wash out the bladder freely with warm water. It rarely happens that this process fails to detach fragments sufficient for our purpose if there is a growth in the interior. But I have recently adopted, after failure by simple washing, the use of an evacuating catheter of small size, connected with the aspirator employed in lithotrity, and by this means have easily obtained specimens which were complete evidence of the presence of a growth. This occurred in my last case, No. 20 of the Table.

There is still another method which, when a fimbriated growth is present, will secure a specimen, and will, moreover, sometimes identify the presence of a salient tumour. It consists in carefully exploring the bladder with a small flat-bladed lithotrite. I discovered my first tumour thus: it was coated with phosphates, and I thought it might be a partially sacculated calculus, as I could seize but could not move it. I have been able to detach small portions of a growth thus, but some hæmorrhage necessarily results.

Supposing, however, that some fragments have been washed out, these should be placed under a ¼-inch object-glass, when the following elements may be sought. First, a portion of a slender papilla, or so-called 'villus,' sufficiently complete for identification, may be met with; the arrangement of columnar epithelium, at right angles to the central axis, and radiating round the terminal point, and presenting a structure which is unquestionable

proof of the existence of such a growth in the bladder. On two occasions I have decided to operate on the strength of this evidence.

Secondly, the appearance to the naked eye of small, slightly translucent, semi-gelatinous fragments in the urine is, of course, very significant. Under the power named, these mostly appear to be made up of spindle-shaped nucleated cells, some comparatively short and broad, others elongated, and some nearly acquiring the character of a short fibre. These fragments have been present in several cases in which tumour has been subsequently found; a fact which, in each instance, is noted in the Table of Cases. In two or three instances I have examined the urine day after day, and found no characteristic structure, but this was before I sought, as I now invariably do, by purposely washing out the bladder. In one or two others I have found great numbers of cells like young pavement epithelium, but these are not sufficiently characteristic to offer any indication available for diagnosis.

We will now consider the subject of treatment. Let us suppose that we have arrived at the conclusion that the bleeding is certainly vesical, and that in all probability it arises from the presence of an intravesical growth respecting which there is no evidence that it is cancerous in its nature: are there any means to be employed for checking the growth, or even for destroying it, without having recourse to a surgical operation involving the use of the knife? Are there any means by which hæmorrhage may be subdued or restrained in cases considered temporarily unfit for operation through exhaustion, &c., or for cases in which operation is only partially successful in removing the tumour, and a portion is inevitably left behind; or for those cases of malignant tumour which are not amenable to any attempt to remove them, and are therefore only susceptible of palliative treatment?

I would reply that, in my experience, I do not know one of the so-called styptic remedies which is of any service in vesical hæmorrhage from any form of tumour. It is exceedingly difficult to prove a favourable result on the trial of any one of these agents. An attack of vesical hæmorrhage naturally runs a short course provided the patient ceases his usual active habits. It is in connection with this influential treatment—viz. rest and

the recumbent position—that styptics are given; and when the hæmorrhage stops, as it has a strong tendency to do, the drug swallowed at the time obtains the credit of a power which almost certainly does not belong to it.

I have much more confidence in astringent injections thrown into the bladder with great gentleness, and through a small soft catheter. The two which I have used, and with great frequency, for cases in which operation is not at present decided on, and especially for those in which the tumour has been only partially removed, are perchloride of iron and nitrate of silver. These latter cases have been far more improved after incomplete operative procedure than I could have anticipated, and their recurring hæmorrhages have been remarkably controlled by these two agents, the iron being perhaps, certainly in two cases, more efficient than the other. The strength employed has been from 20 to 60 minims of the tincture of the perchloride of iron in 4 ounces of cold water; to be used daily once or twice, according to circumstances. Of the nitrate of silver, from gr. i. to gr. vi. in 4 ounces of water; the stronger solutions being rarely tolerated or necessary.

In regard of malignant disease above alluded to, I may in this place briefly but emphatically state, that if the physical characters and symptoms, especially the former, indicate the presence of a growth of this nature, any operative proceedings for its removal must be not merely futile and imperfect, but extremely dangerous, and ought not to be undertaken. It does not follow, however, that in such cases the drainage of the bladder by a perineal opening may not, in certain circumstances, be a useful proceeding to relieve suffering or prolong life, &c.

Lastly, I do not propose to do more than name here the great importance of careful attention to the digestion and state of the bowels, in all cases of hæmorrhage from intrapelvic sources, but shall return at once to consider the only means of affording permanent relief to the subject of vesical tumour, namely, the operation for its removal.

Let us suppose that digital exploration has been made by external urethrotomy, and that the steps of the proceeding have been followed, as described in the preceding lecture; and, further, that the operator, on introducing his left index finger, at once encountered a growth of some kind. He should first deliberately

spend some two, three, or four minutes, if necessary, in ascertaining its size, situation, and general outline.

Pressing the abdomen firmly with his right hand into the pelvic basin, he soon ascertains whether the tumour be attached to the wall of the bladder by a narrowish pedicle, or whether it be rather an outgrowth which springs from a considerable area of the coats, and is inseparable from them. He traces the surface, which may be broadly mammillated, one or many lobed, or simply polypoid, firm in contour, or soft and fleecy. Lastly, he observes whether the whole is dense, compact and immovable, or soft, more or less floating, and perhaps fragile. It is important to have a distinct idea of the situation of the tumour, as to whether it lies more to the operator's right or left, which is at once apparent in most instances; then, whether it belongs more to the side or to the floor of the bladder, or whether it springs from the opposite surface farthest from the meatus, or from the upper aspect of the cavity. The mind soon forms a distinct image of the body to be dealt with, and simultaneously arrives at a judgment as to whether it be possible to remove it entirely or partially, and if the latter, whether a sufficient portion can be safely taken away to warrant further surgical interference. If the tumour be polypoid in form, with a distinct pedicle, narrow, or even wide, there can be no doubt as to the propriety of operating. But if the growth admits of considerable portions being removed without injuring the substance of the vesical coats, which should be approached with great caution, then also my opinion is that such portions should be attacked, under the conditions hereafter to be named. When, on the other hand, the substance is hard, and exhibits no marked prominence of contour, characters usually found to be associated, no such attempt should be made; a small portion may be easily removed for microscopic examination, and that should be done.

But now comes an important consideration which should be carefully disposed of before any interference with the tumour takes place from the perineal opening.

When the survey of the vesical cavity has been completed, the operator has to determine the following question: Am I capable of completing my design of removing the tumour before me, wholly or partially as the case may be, through the incision made, or should I do so more efficiently through a supra-pubic

opening? For it may be taken for granted that a case may occasionally present itself in which the latter course may appear to be preferable, and if so there is no reason whatever for not selecting it. The perineal incision made will not add to the risks of the case, and it has afforded that most important element, the means of obtaining an exact diagnosis.

Now I may here say that my proposal to remove vesical tumours by perineal urethrotomy has met with a direct challenge in Paris from my friend Professor Guyon and his school, who say that the supra-pubic operation should be invariably employed for the purpose, and the perineal operation never. I cannot refrain from suggesting that the emphasis with which this doctrine is just now enunciated by some would be more authoritative had the writers ever tested the method I have now so often practised. There can, I suppose, be no hesitation in anyone's mind that the high operation is a much more formidable and hazardous proceeding than the simple boutonnière. Why, then, should the former be practised in any case until absolute certainty is attained, not only that tumour is present, but also that it is removable by operation? No doubt that in a considerable proportion of suspected cases the presence of tumour can be regarded as strongly probable; but in very few can it be stated with certainty until the finger has entered the bladder. In no single case can the surgeon ascertain whether or no the tumour in question is separable from the bladder until the cavity has been opened, and the physical conditions examined. Well, all these facts—first, the fact of the presence of tumour; secondly, its form and size; thirdly, the nature of its connections with the vesical structures—all the data necessary for determining the question of operation can be attained by a slight urethral incision which involves no risk. What imprudence, then, can be greater than that of performing the high operation with all its admitted risks, while the operator does not know for certain that a tumour is present; and while he knows that if he does find one, the numerical chances are that the tumour, although thus completely approached and laid bare, cannot be entirely removed without inflicting fatal injury on the patient, since one-half the cases are not completely removable?

Further, I declare that while the boutonnière enables the surgeon to ascertain all the facts which it is so necessary to obtain before operating, it also enables him to remove the tumour

without difficulty when it is polypoid in form, and therefore capable of being removed with a fair amount of ease and safety. If, however, he believes—and he is then in a position to determine the question—that he can attain a better result in any particular case by the high operation, there is nothing whatever to prevent his performing it. In one, or at most two, of my twenty cases, in two of the early ones perhaps, I might have so operated with advantage. I should probably do so now on again encountering similar conditions; but in all the remaining cases the risk to the patient would have been greatly increased by performing the high operation, and I should have acquired no facility for removing his tumour beyond that which external urethrotomy afforded me.

We shall now consider the means which it is desirable to employ in order to remove the tumour, when, having examined it fully, we have decided to make an attempt through the perineal opening. First, if we have the good fortune to encounter a single growth, polypoid in form (see diagram in the Table of Cases, Nos. 1 and also 13 and 15), and therefore with a pedicle of no great width, there need be no hesitation whatever in introducing a pair of forceps into the cavity of the bladder, and employing them there without any aid from the operator's finger. The forceps to be used for this purpose are to have rather wide and serrated margins where the blades meet, so as to crush, but without any power to cut the tissues seized. These forceps should be provided in different forms. The first, or simplest pattern, should be straight, resembling an ordinary lithotomy forceps (fig. 11). Others should be curved, for seizing tumours which are situated

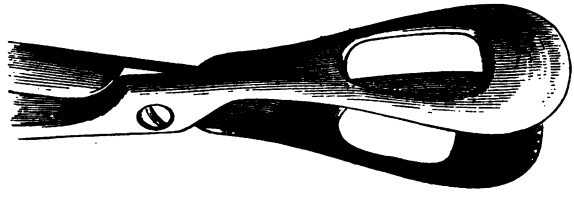


FIG. 11.—Straight forceps.

laterally and near to the neck of the bladder, in which last-named position the straight forceps is powerless to grasp the tumour (figs. 12 and 14). A pair of each pattern should have cutting edges for exceptional cases, when, for example, the growth is more firm and solid than usual. When the blades are

free in the cavity, they have merely to be opened easily and widely, and on closing them it is almost certain that they will grasp the polypus more or less completely. The proceeding thus

FIG. 12.—Slender, laterally curved forceps, for removing a growth close to the neck of the bladder.

FIG. 13.—The same forceps looked at from the front, so as not to show the curve.

advised is more likely to prove successful in accomplishing its object than is the attempt to seize a stone in the bladder. But here let it be observed, that no supra-pubic pressure should be

FIG. 14.—Curved forceps for tumours, occupying the sides of the bladder.

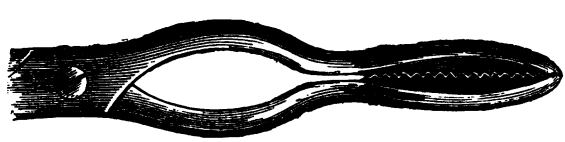


FIG. 15.—The same forceps looked at from the front.

made during this act; nothing should be done to interfere with the natural contour of the bladder. The operator, by light and easy movements of the forceps in varied directions, ascertains that he has the growth within their grasp. My advice is that, above all things, he is not now to pull forcibly, but that he is to press firmly the blades together, biting or chewing a little, if I may use the terms, with the extremities of the blades, without changing

the original situation of the bite or grasp. Then a little twisting movement may help to disengage the mass, which if accomplished the forceps will be felt free, and may be withdrawn with their contents; after which the finger enters to feel what remains, and what more must be done in order to complete the removal. Let me remark that whenever the forceps has removed a portion, however small, the instrument should never be again introduced until the finger has first re-examined the interior, and enabled the operator to form a fresh estimate of the portion remaining, if any, to be removed. But, supposing that the tumour has not been separated by the moderate amount of forceps action described, the operator may disengage and remove them; when on introducing the finger he will probably find the part so nearly severed that the actual division may be completed with the finger nail, or with one of the little serrated instruments which I have

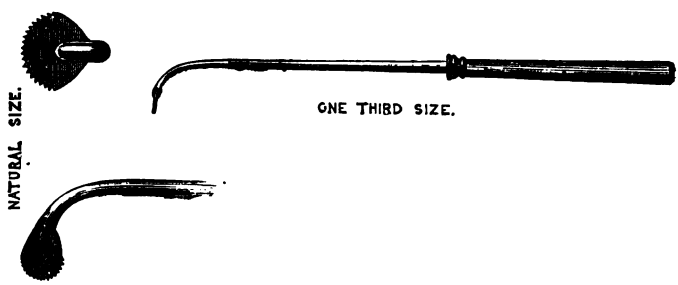


FIG. 16.—Instrument with serrated end for separating by rotatory movement a portion of tumour fixed by the index finger. Seen in profile, one-third natural size. The end is shown in two positions of the natural size.

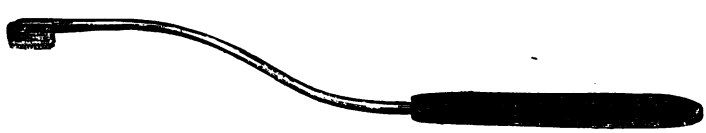


FIG. 17.—Another serrated instrument, curved in form.

designed for the purpose, and for the employment of which there is ample room through the urethral wound, by the side of the index finger (see figs. 16 and 17). There is really no difficulty, nor is there any risk, with ordinary care, in removing a growth or two of pedunculated form, sufficiently near to the walls of the bladder to render the operation a permanently successful one. I suppose that the ultimate result of dividing the pedicle of a tumour in the manner described is such a cicatrisation of the

wound as to prevent the recurrence of outgrowth from that spot hereafter.

But other means may be used according to the judgment of the surgeon. A very small écraseur, with violin-string ligature, may be manipulated by the side of the index finger, and used in polypoid forms of tumour. In the cases of women such a tumour may sometimes be slowly and carefully brought into view by traction on the forceps, and then the pedicle may be ligatured. I have succeeded in doing this in one case; so has Mr. Bryant. In another I drew a polypoid mass within view, and found it was a completely encysted calculus; I then opened the mass, when the calculus escaped.

But in the male it has occasionally happened that the tumour can be drawn through the wound, as happened with Mr. Davies Colley, and also with Mr. Morris, in whose case the growth seemed to have been extruded by natural vesical efforts on the day after operation (having been left untouched on the first), and was then removed, the patient making a good recovery.

But when the growth takes a more complex form—one in which several rounded lobes spring from a wider base—an example of which may be seen in diagrams Nos. 4, 7, 13, 16—the forceps must be depended upon for removing them by repetitions of the same process which is employed for the single growth. But when the base is wider still and the growth is less prominent, as that represented in diagrams Nos. 5, 12, 17, 18, 19, it is doubtful if complete extirpation is possible by any proceeding, whether through a perineal or through a supra-pubic opening. The wide base involves such intimate continuity of tissue between the coats of the bladder and the structures of the growth, that I believe separation to be mostly impossible; and that ablation of the prominent portions of the growth, when feasible, should be undertaken only with the view of retarding its progress, but with no prospect of effecting complete separation of the disease from the body.

These portions are to be seized and destroyed, partly by removal on the plan just described, and partly by crushing, and thus inducing sphacelus and sloughing of the growth. The question of applying some chemical astringent arises in such cases, and its utility may be regarded, perhaps, as twofold. A solution of the perchloride of iron may tend to check the hæmorrhage, which is

almost invariably very free, for a few hours after the removal of wide-based growths, and it may partially destroy the portion which remains after the forceps has done its work. For this purpose I have contrived a straight and also a curved glass syringe containing a small sponge, saturated with solution; the sponge being pressed by the piston permits the escape through small perforations at the extremity of from 30 to 60 minims of the solution, at the precise spot where it is desired to make the application.

There is one circumstance important to be noted, especially in dealing with the less prominent growths; and that is, the effect of strong supra-pubic pressure made by an assistant in relation to their apparent situation, and their mode of presentation to the finger of the operator engaged in exploring the bladder, and in estimating their size and form. If that pressure is considerable, it forces the upper wall of the bladder into its own cavity, and thus gives to the growths a larger contour than they possess, and makes them apparently salient to a much greater extent than they really are. Thus an eager or inexperienced operator, unaware of the effect of supra-pubic pressure, might be led to seize the mass thus offered to the forceps, through the influence of this pressure, and under the belief that it was a large growth, he might inflict a fatal wound by crushing a double fold of the coats of the bladder, and so making an opening in the peritoneum. To avoid such a catastrophe it is only necessary, first, to decline the attempt to destroy any growth which is clearly not sufficiently salient to admit of complete or nearly complete removal; and secondly, never to employ the forceps while forcible supra-pubic pressure is made; at least, no more pressure than is desirable just to steady and support the bladder and the parts adjacent.

We have now, finally, only to consider what are the results which have been attained by the perineal operation in relation to vesical tumours.

Of the twenty cases of tumour two were in women; one of these died in three days of total suppression of urine: autopsy showing advanced disease of kidneys (one contained a large calculus), and that no injury was inflicted upon the bladder. The other is now in excellent health, having entirely lost her painful symptoms; observing a few drops of blood, occasionally, after more exercise than usual: more than two years have elapsed since the operation.

Of the eighteen male cases five died within three weeks after

the operation; three others died at periods of some months after, two of them from malignant disease developed elsewhere. The other nine are living; one of these, from whom I removed a tumour in the autumn of 1882, I operated on again, removing a larger growth than the original one last February, and he has again recovered. In four cases no attempt was made to remove the tumour, it being manifestly impossible to do so, but only to diminish it as far as practicable with safety; all these recovered well, and are rather better than before. Of the remaining four one has had no return whatever, four years having elapsed since the operation; a second has slight signs of a return, one year and a quarter since operation, but works hard for his living at sixty-four years of age; a third, who, like the last, was at death's door from loss of blood when I operated, has greatly improved, and is actively employed, but has recently shown some disposition to bleed after exercise, nearly a year since operation. The fourth was greatly improved, and returned to the active life for which he was before disqualified. The others have too recently been operated on, to furnished any material fact to be reported. More ample details are furnished in the Table of Cases drawn up and accompanying this.

I may thus sum up these numerous details, with which I fear your patience must be long since worn out. For every one of these patients with tumour, in the natural order of events, one result only was possible. Left without surgical aid, death inevitably awaited each; a fate not merely certain, but necessarily involving protracted suffering.

Whatever surgery can accomplish in the way of saving life in several of these cases is obviously so much clear gain. I am therefore satisfied with what has been achieved for the first twenty cases; having naturally desired greater success; and I have reason to expect that it will be greater in the next twenty cases, through having acquired some valuable experience which I have thus attempted, so far as this is possible, to make useful to others.

We may certainly reckon on ability to save life in a few instances, such as are recorded here; we may also often prolong valuable life, a fact illustrated by several of the cases recorded both by myself and by other operators.

There is still another result which ought not to be overlooked. Whatever value may have accrued to a few patients in the matter

of saving or prolonging life, a question which is wholly incalculable, there has been an opportunity afforded, on a scale never before met with, for careful inquiry into the external physical characters and histological elements of vesical growths. This research has been systematically pursued; and with the aid of valuable co-operation already referred to, I have been able to present a scheme for classifying the facts obtained, which I trust may prove to be a contribution, however humble, to an improved acquaintance with this important subject.

TABLE OF TWENTY CASES OF OPERATION FOR VESICAL TUMOUR, EIGHTEEN ON THE MALE AND TWO ON THE FEMALE, PERFORMED BY THE AUTHOR, WITH THE RESULTS UP TO A RECENT DATE.

TABLE OF TWENTY CASES OF OPERATION F

Date of operation	No.	Case	Age	Duration of symptoms	Earliest sign observed	Result of urine examination	Complica with calc
1880, Nov. 6	1	T. R.	29	3½ years	Blood in the urine	Not examined, no growth being expected; the operation was made for a supposed encysted calculus	A small late of l and pl phatic culus crushed
1882, May 9	2	Mrs. F.	30	6 „	„	Ditto	—
Nov. 3	3	B. G.	46	1 year	Frequent micturition; blood much later	Much large cell-growth; various forms	—

?AL TUMOUR BY SIR HENRY THOMPSON.

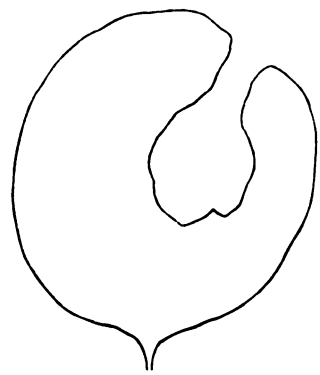
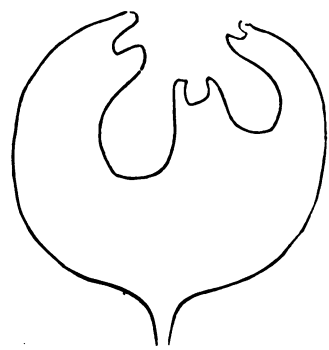
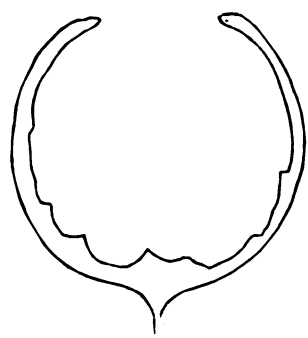
re of tumour	Operation and result	Diagram of form and situation of tumour
›apilloma	Single polypoid growth; removed at base by forceps. Dr. Paggi, of Florence, Dr. Seegen, of Carlsbad, and Mr. Ceeley, of Aylesbury, present. Rapid recovery. Living and well, spring 1884	
- papilloma: 'club-shap-ocesses,' not ler papillæ illi' (Mr. S. l)	Polypoid growths; removed by forceps; recovery rapid. Seen with Dr. Philson, of Cheltenham. February, 1883. Removed a small growth which I had been unable to grasp at first operation for want of forceps acting laterally; she was well in a few days and returned. 1884, April 17: heard that she is quite well; there is no frequency of passing water; no pain; after exercise a trace of blood is sometimes seen	
ıps interme- › between lloma and ›ma.' Proba- belonging to group termed e 'transi- al' (Mr. S. l)	Very large; almost entirely removed by forceps; great hæmorrhage; died few days after operation; no autopsy permitted; probably some giving way of bladder at base of tumour	

TABLE OF TWENTY CASES OF OPERATION F

Date of operation	No.	Case	Age	Duration of symptoms	Earliest sign observed	Result of urine examination	Complicati with calcu
1882, Nov. 20	4	Dr. M.	52	5 years	Blood in the urine	Shreds formed of fusi-form cells	—
1883, Jan. 17	5	E. K. G.	67	6 „	„	Ditto	A small ur acid calc lus crush
„ 30	6	T. F.	67	3 „	„	Numerous fusiform cells and fibres	—

VESICAL TUMOUR BY SIR HENRY THOMPSON (continued).

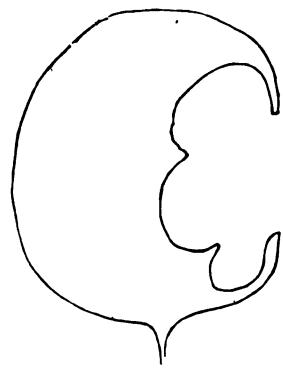
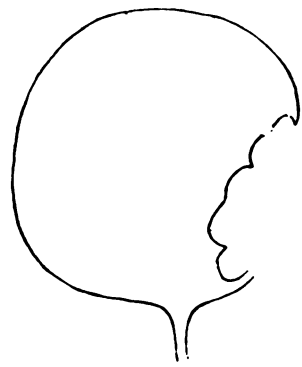
Nature of tumour	Operation and result	Diagram of form and situation of tumour
The base of the growth contains unstriped muscular fibres not continued into the filiform processes, which arise in great number, and form long villi. Normal bladder tissue with fimbriated papillæ (Dr. H. Gibbes)	Rather broad-based growth, springing from side of the bladder. Seen with Dr. Geo. Johnson. The patient was free from bleeding for nearly six months after operation; then little blood seen after a seven miles' walk, and continued. In June, 1883, I made a slight exploration and removal, followed by relief. On February 10, 1884, I again explored, and removed a larger quantity than on either previous occasion; the bleeding had been very severe during the preceding two months. He made a slow recovery, being much exhausted prior to the last operation	
Papilloma; resembling structure of 'soft warts' (Mr. Shattock)	Sessile, and partially removed. Returned to Cape; probable reappearance of the tumour. Heard of his death there subsequently	
Epithelioma (Dr. H. Gibbes)	Broad and sessile; removed much of it. Signs of reappearance of tumour in the spring; and in the summer he died	

TABLE OF TWENTY CASES OF OPERATION F

Date of operation	No.	Case	Age	Duration of symptoms	Earliest sign observed	Result of urine examination	Complicat with calc
1883, Feb. 8	7	W. W.	63	7 years	Blood in the urine	Well-marked villous growth	—
„ 21	8	J. M.	64	1 year	„	Never found any characteristic débris in urine	—
„ 27	9	Mrs. O'R.	65	7 years	„	Large spindle-shaped cells	Calculus left kidn large; b kidneys eased; p litis

?AL TUMOUR BY SIR HENRY THOMPSON (*continued*).

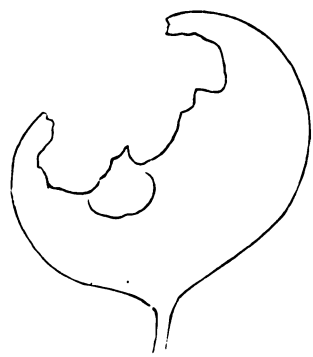
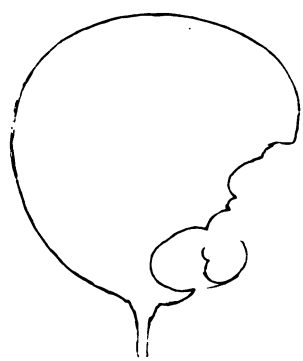
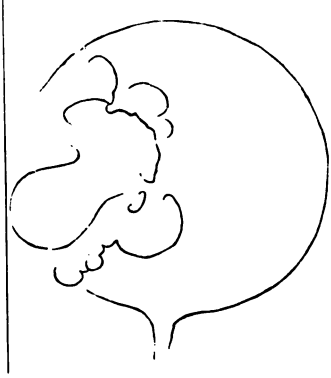
re of tumour	Operation and result	Diagram of form and situation of tumour
ated papil- chiefly; vascular (Dr. ibbes)	Rather broad-based polypoid growth; freely removed. He was so weak with long-continued hæmorrhage, I almost feared to operate. Living and well in the spring of 1884, working as a bargeman on the Thames. Seen with Dr. Geo. Johnson	
sed of nor- ladder tissue; iated pa- (' villi ') dant: no ture resem- malignant th was found H. Gibbes)	Broad and sessile; removed rather freely. Died two months after with secondary malignant growth in thigh. Seen with Dr. Harvey, of Bayswater	
oma (Mr.)	Large tumour, freely removed, leaving the base, which was broad. Died three days after with suppression of urine. Seen with Mr. Thurland, of Wilmington Square, with whom autopsy was made. Kidneys much diseased; large calculus in the left	

TABLE OF TWENTY CASES OF OPERATION .

Date of operation	No.	Case	Age	Duration of symptoms	Earliest sign observed	Result of urine examination	Complic with cal
1883, Mar. 3	10	J. S.	53	2¼ years	Frequent and painful micturition. Blood at later stage	No characteristic débris found	—
„ 30	11	W. D.	65	1 year	Blood later	Numerous long cells and fibres	—
May 4	12	C. C. S.	56	2 years	Pain first; blood later	Nothing found	—

VESICAL TUMOUR BY SIR HENRY THOMPSON (*continued*).

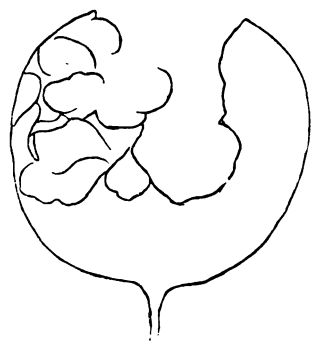
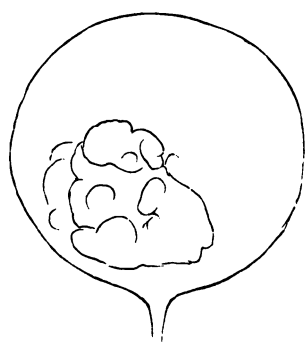
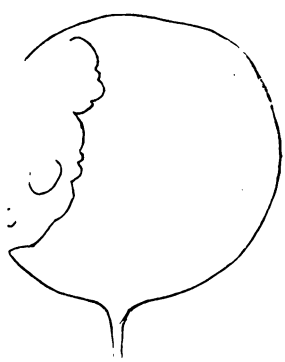
Nature of tumour	Operation and result	Diagram of form and situation of tumour
Tissues like those forming the wall of the bladder, with fimbriated papillæ (Mr. Shattock)	Large hard tumour partially removed; largely involving the coats of the bladder. Died few days after operation. Sent to me by Dr. Maguire, of Holyhead	
Tissues like those of the walls of the bladder, and some papilliform growth in small quantity on surface (Dr. H. Gibbes) Fibro-papilloma	Sessile; firm; removed salient portions. Died fourteen days after operation, of exhaustion. Seen with Mr. T. W. Mason, of Regent's Park	
Example of growth termed 'transitional.' The structure resembles a 'hypertrophy of the submucous coat of the bladder; collections of round cells in some places resembling lymphoid tissue; no papillomatous growth present' (Dr. H. Gibbes)	Tumour firm, sessile; inseparable from walls of bladder; removed salient portions only. Living; symptoms relieved at present; probably from drainage of bladder. 1884, May 10: came to see me; washed out many small phosphatic concretions with great relief. Tumour not much increased; occasionally some blood in urine; on the whole the symptoms not worse	

TABLE OF TWENTY CASES OF OPERATION

Date of operation	No.	Case	Age	Duration of symptoms	Earliest sign observed	Result of urine examination	Comp with
1883, May 9	13	T. Q.	52	4 years	Frequent micturition and pain. Blood seen two years ago	Passed mass, the size of large pea, of soft fleshy material in urine; when examined by Dr. H. Gibbes appeared to be portion of growth, composed of normal vesical elements	N
June 27	14	A.G.S.C.	57	4 „	Frequent micturition: soon after an attack of bleeding	No cells of suspicious appearance found in the urine	—
July 7	15	J. H. B.	40	3 „	Blood seen at the first; now daily and profuse bleeding. Micturition never very frequent	No evidence obtained from the urine	—

ESICAL TUMOUR BY SIR HENRY THOMPSON (*continued*).

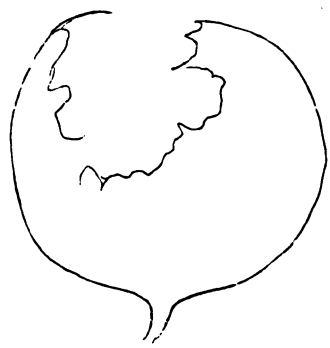
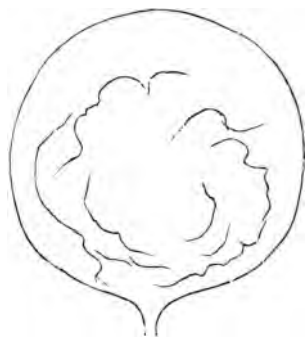
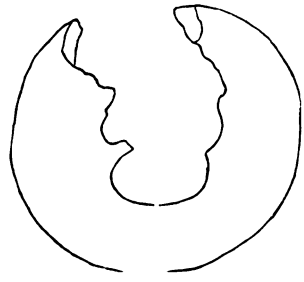
Nature of tumour	Operation and result	Diagram of form and situation of tumour
ade up of unstriped muscular fibres, with numerous tubes and crypts lined with columnar epithelium; probably malignant (Dr. H. Gibbes)	A soft growth, removed to the base. Much bleeding up to second day; became feverish, indisposed to take food, and gradually sank on the twelfth day. Mr. W. Adams, of Regent's Park, was present at the operation	
ade up of unstriped muscular fibres; numerous small cells interspersed; numerous fimbriated papillæ (Dr. H. Gibbes)	Sessile growth, implicating the walls of the bladder, and could only be partially removed. Rapid recovery. Dr. Weir, of New York, was present. Had no bleeding for two months after operation. April 17: micturition frequent and painful; much blood at times; the growth evidently increasing	
body of the mour made up normal elets of the vesiwalls with and there inration of small nd cells. Abunnt fimbriated ocesses, 'vilis' from every rt	A rather large polypoid growth removed entire at once. Recovery rapid. An assistant to Dr. Bell, of Rochester. Professor Holmer, of Copenhagen, present. He was so reduced by persistent hæmorrhage, that I operated with great reluctance. 1884, April 20: he writes that he is actively employed, but has seen after exercise 'occasionally a few drops of blood, just as he did three or four years ago;' 'health good'	

TABLE OF TWENTY CASES OF OPERATION

Date of operation	No.	Case	Age	Duration of symptoms	Earliest sign observed	Result of urine examination	Compl with c
1883, Nov. 16	16	T. S.	42	8 years	Attacks of hæmaturia; of late micturition frequent	Shreds of tissue passed, made up of spindle-shaped cells and fibres with nuclei on them	-
1884, Feb. 5	17	D. of B.	50	nearly 4 years	Attacks of frequent and painful micturition, with little blood	Shreds of tissue washed out show villous structure	—
Mar. 12	18	W. G.	69	—	Blood occasionally seen eight or ten years ago; last four years very often; frequent micturition only recently	Shreds of tissue washed out show numerous large nucleated spindle-shaped cells	—

'AL TUMOUR BY SIR HENRY THOMPSON (*continued*).

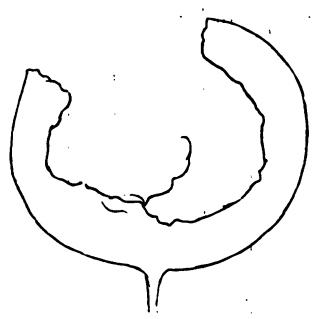
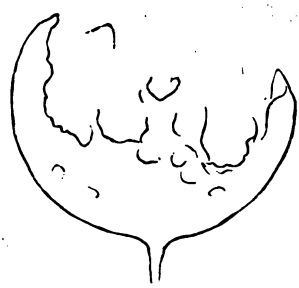
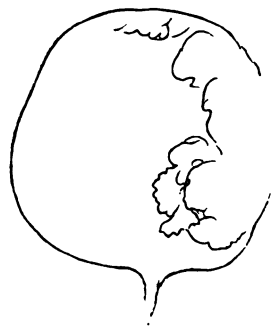
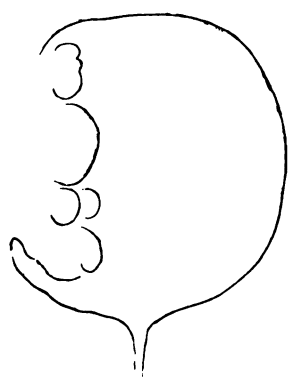
ı of tumour	Operation and result	Diagram of form and situation of tumour
structure adder co- with fim- ł papillæ; groups of cells are n places in ıbstance of ıpillæ (Dr. ›bes)	Growth like a cauliflower, from rather wide base; removed all but the latter; A good recovery. Seen with Mr. Woodcock, of Knutsford, Cheshire, who was present at the operation. 1884, May 10: called on me. He attends to the active duties of his profession as land-surveyor, but after more exercise than usual sees a little hæmorrhage. Has been busily occupied some days in London and seen no blood; no frequency or pain in micturition	
structure ıdder, with ·ous large e, from spring the fimbriated ses in ance; a few ıytes seen I. Gibbes)	A firm broad-based growth from the back of the bladder; from which I removed the salient portions; and it appeared to me that a suprapubic operation would not enable me to remove the tumour entire. June 3: symptoms now very slight; no pain; walks three miles without seeing blood	
structure ılderchiefly; ng papillæ villi,' but papillæ co- with strati- ›lumnar epi- ım (Dr. H. ıs) -papilloma	A broad-based sessile mass, of firm consistence, involving the coats of the bladder; it would be useless, therefore, to propose suprapubic operation. Removed two or three salient portions. He gradually sank, about three weeks afterwards. Seen with Dr. Geo. Johnson, who was present at the operation	

TABLE OF TWENTY CASES OF OPERATION

Date of operation	No.	Case	Age	Duration of symptoms	Earliest sign observed	Result of urine examination	Complic with cal
1884, April 4	19	F. J. O.	58	9 months	Severe bleeding first	Nothing found in the urine	—
May 30	20	R. S. R.	63	15 „	Bleeding after exercise was the first sign	Fragments removed from the bladder by the aspirator, nothing being found in the urinary deposit by simply washing out	—

VESICAL TUMOUR BY SIR HENRY THOMPSON (continued).

Nature of tumour	Operation and result	Diagram of form and situation of tumour
Normal structure of bladder chiefly; groups of small round cells; some like inflammatory cells: resembling Cases 12, 14, and 16: and regarded as 'transitional.' No long papillæ (Dr. H. Gibbes)	A firm broad sessile tumour, with very slight lobulation; could not be separated from walls of the bladder. Removed a small portion for examination. Wound soon healed. Seen with Dr. Dove, of Pinner	
Normal structure of bladder, covered with columnar epithelium; under latter, round cells like 'lymphoid tissue;' somewhat uncertain (Dr. H. Gibbes)	A firm multilobular tumour, with broad peduncle, which was removed almost level with the walls of the bladder. Dr. Shippen, of New York, and Dr. Charamis, from Paris, present. Recovering rapidly. June 7, 1884	

LECTURE IV.

IMPAIRED VESICAL FUNCTION: ITS VARIOUS FORMS AND CONSEQUENCES.

I HAVE selected the subject embodied in the following title—'Impaired Vesical Function and its Results'—because I venture to think that it is one which has not received the degree of attention from the profession which its importance demands. I feel little doubt you will concede that such an opinion is not likely to be expressed without sufficient warrant and due consideration. It is however a fact, which many years' intercourse with my brethren, by way of consultation, not only here but abroad, has brought very prominently under my notice, that impaired vesical function is, among the many cases brought to me for solution, a morbid condition which is the cause of symptoms more frequently overlooked than any other in the range of urinary pathology.

We all know that it is by no means very unusual to meet with urethral stricture, previously undetected, as the source of much discomfort and annoyance, which have been endured for a long period of time, and which have been treated fruitlessly in ignorance of the pathological condition occasioning them. Again, it is not uncommon to find an unsuspected calculus, the hitherto latent origin of chronic complaints; but then calculus retained in the bladder is, compared with the affection now referred to, a rare condition. It is still more common to discover the presence of sugar in the urine, which, much treatment notwithstanding, had not before been sought or found. But far more frequently does it fall to my lot to show that a long history of increasing urinary troubles, which, up to the present time, had appeared inexplicable, is due solely to the fact that the bladder, for some reason or another, is imperfectly performing its functions; and that if these can be restored, or artificially performed, the chief troubles and risks affecting the patient will be removed.

And what I have said of the inaptitude to appreciate this condition here, applies, I believe, with equal force to foreign practice generally. Formerly it surprised me greatly, on receiving a patient from abroad, suffering with a long-standing and obstinate 'catarrh of the bladder' (as he has been taught to call it), to learn the amount of treatment he had received, without any recognition of the fact that he was unable to empty the bladder by his natural efforts. And this, notwithstanding that the treatment had been of a nature which could not fail to reveal that significant circumstance, since the bladder had been washed out, perhaps for months, with various therapeutic agents, at least once or twice a week. Meantime the patient had been subjected to considerable courses of balsamic and terebinthinate remedies; had been sent to Contrexéville certainly, perhaps to Vichy; had taken baths at home, diluents largely, and a strictly regulated diet, and, finally, perhaps a course or two of locally applied electricity. The simple fact that he never emptied his bladder, that he always retained some four to six ounces of urine, however much he passed by his natural powers, had been disregarded; for it is scarcely possible to imagine that the condition could be overlooked, local injections being part of the treatment. In any case it is certain that the medical practitioner, in such a case, could have no adequate sense of the importance of the fact referred to, or he would have ascertained it speedily, and at once have pursued a different mode of dealing with it.

Let it be understood at the outset, that the cases now alluded to do not necessarily belong to that large category in which hypertrophied prostate is the mechanical obstacle to the due performance of vesical function, and the indications of which are pretty generally, although not always, recognised. Doubtless such prostatic change accounts for incompetency on the part of the bladder in a large proportion of cases, but it is by no means the cause in all. There are indeed numerous examples of impaired function due to causes in which disease of the prostate has no share.

But, before proceeding further, we will inquire what are the natural functions of the bladder regarded as a reservoir of urine.

The first function of the bladder is its ability to retain a considerable quantity of urine without occasioning any inconvenience to the individual, and without arousing in him any consciousness

of its presence; and the mechanical attribute essential to the healthy organ is large extensibility of all its coats.

The second function of the bladder is the ability to empty itself, easily and completely, at the will of the individual; and in order to accomplish this, the coats of the reservoir must possess elasticity, which is a mechanical attribute, and also contractility, which is to be regarded as a 'vital' one. Speaking in general terms, this latter function is performed by the unstriped muscular fibres, which compose a large part of the vesical walls, while the connective and elastic tissues, intimately associated, and also entering into the substructure of the lining or mucous membrane, possess the mechanical quality of elasticity. The primary or basement membrane, with its epithelial covering, is arranged in innumerable small doublings, which are unfolded, as the cavity of the bladder slowly and gradually increases in size, to make room for the entry of urine by the ureters. This duplicature appears to provide for an area of surface which may be very considerable, so that the bladder may be much distended without undue stretching of the inner coat. It is well seen under the microscope in a very successful section by Dr. H. Gibbes, made especially for the purpose immediately after death, in the bladder of the monkey, as it is impossible to attain the necessary condition in a human subject.[1]

In the healthy condition of the bladder, the gradual yielding of the tissues just described continues during several hours until many ounces of urine are contained therein, without producing any sensation notifying the fact of their presence. In the adult this quantity varies between fifteen and twenty ounces, or a little more in different individuals; but when a certain degree of distension has been occasioned by accumulating urine, a desire to pass it is felt, as slight commencing contraction of the vesical walls takes place, which, if complied with at once, becomes forcible, and is aided more or less effectively, according to circumstances, by certain voluntary muscles of the trunk, as well as by the diaphragm. The result is, issue of all the urine previously contained in the cavity, while the canal of exit is emptied also; so that if a catheter be passed immediately, not one drop will leave the instrument. If the first want to pass water is not complied

[1] An admirable representation of this is engraved in the author's work on *Tumours of the Bladder*, Pl. 1, p. 57. London: Churchill, 1884.

with, slight uneasiness results, and soon disappears, it may be, for an hour or so, before reappearing. A fresh stage or degree of the distending process seems to be readily and safely accorded when circumstances demand a longer retention than usual; and during this period no discomfort is felt: at its termination, however, the demand for relief is mostly imperious. The condition of an empty bladder, then, is scarcely to be described with accuracy as a cavity, although this term is conventionally used in order to avoid circumlocution. Throughout every part of the interior there is close approximation of adjacent surfaces of mucous membrane; and so accurately made, that (as may be ascertained by washing out directly after an act of micturition) not only will no urine issue by catheter, but merely the presence of a drop or two, since it is constantly entering by the ureters, can be verified. It is unnecessary to say that no air whatever enters, even by the use of the catheter, and that air can only be introduced by forcible injection. The mechanical condition of the bladder when emptied, therefore, may be described as that of a rather small mass, composed partly of contracted organic muscular fibres, and partly of non-contractile tissues, which latter are packed together by the most delicate and intricate arrangement of folds, so that practically no interstice whatever exists, much less anything which can be termed a cavity.

It will now become sufficiently obvious how strong is the probability that various morbid conditions may have the effect of impairing the two vesical functions—viz., the one, of expanding, to retain a quantity of urine; the other, of contracting, to expel the whole of it—and that so delicate an apparatus may be deranged by more than one form of disease. And such is the fact.

Regarding the views generally received at the present day, I think that three chief modes by which impairment of the vesical retaining function takes place, are commonly recognised; and they may be represented as designating three classes, as follows:—

Class I. Enlargement of growth from the prostate, obstructing more or less completely the urethra at its entrance to the bladder, and so presenting an obstacle, which the expulsive power of the bladder and associated muscles cannot surmount.

Class II. Loss of nerve-power to the muscles of the organ, constituting paralysis.

Class III. 'Atony' of the structures of the bladder, invalidating their action: a term of doubtful import, and ordinarily so employed as to comprehend all other forms of vesical incompetence not designated by Classes I. and II.

I shall first deal somewhat briefly with Classes I. and II., and subsequently more at length with Class III.

The first class, constituted by prostatic hypertrophy and outgrowth, is familiar to all surgeons; and the frequency with which this condition impairs the vesical functions is sufficiently obvious. Nevertheless, its proneness to occasion habitual retention of urine is more frequently overlooked or disregarded than it ought to be. Notwithstanding, prostatic enlargement was formerly supposed to be so common as to be a natural accompaniment of advanced age, instead of being, as it really is, quite an exceptional condition. I may claim to have made the first numerical estimate based on extensive researches, in order to determine the time of its appearance, in regard of the age of the individual; as well as of its frequency of occurrence in regard of the population. The results of dissections commenced by myself, amounting to ninety-four in number, and continued by my friend Dr. Messer, R.N., at Greenwich Hospital, who examined a hundred—amounting in all to one hundred and ninety-four,—were as follows:—

1. That no case of hypertrophy was discovered before fifty-four years of age. 2. That the proportion of elderly adults affected anatomically, although not by symptoms, was one person in three after that age. 3. That the proportion of such adult individuals affected by any manifest symptoms was slight, being probably not more than one in fifteen or twenty.[1]

Now, in connection with the presence of hypertrophied prostate as a cause of retained urine, which the bladder is unable to expel, there is a fact having an important bearing on practice, to which I desire to call attention. An elderly man, who has been for some time annoyed with unduly frequent micturition, seeks advice, and is treated by his medical attendant, who at first naturally endeavours to improve the general health, and does so, probably with some slight advantage to the local trouble complained of. Subsequently he suspects prostatic enlargement, examines his patient by rectum, and, finding no trace of it there, concludes that it is absent.

[1] *Royal Med. Chir. Trans.* vol. xl. p. 77, 1857.

Nevertheless, the most complete form of organic occlusion at the neck of the bladder may be present, giving rise to the symptoms complained of. There is little doubt that a very small prominence at the point named is not seldom the occasion of absolute incompetence on the part of the patient to relieve his bladder. While the effect of a very large hypertrophy is generally a modification more or less considerable of that function, the very small growth often arrests it altogether. The existence of the little eminence is not demonstrable during life by any means that I know of; its presence may be suspected and on good grounds be regarded as probable. No method of dealing with it by sound or catheter in any form, whatever may have been alleged in regard of this inquiry, can, in my opinion, enable the surgeon, however experienced, to affirm with certainty the presence of the very small growth described. It generally springs from that portion of the prostate which is intermediate between the two lateral lobes, once called 'the third lobe,' a term not warranted by the anatomical condition of that part in the healthy organ. I have found it, on dissection, associated with inconsiderable signs of commencing hypertrophy in the structure of the prostate, but it may be the sole cause of a complete retention of urine which lasts for life. It is mostly rather a small outgrowth from the part named, than a general hypertrophy of the organ.

When, therefore, we meet with a patient approaching sixty years of age, in whom habitual retention of urine, to the extent of some ounces, has been discovered, and a rectal examination intelligently made fails to detect any enlargement of the prostate, while no evidence appears in the history or present circumstances of the patient that he is or has been the subject of any form of paralysis, or that he is suffering from simple atony of the bladder following some known occurrence of prolonged over-distension, the presence of a small prostatic growth at the neck of the bladder may be fairly suspected. Now the morbid condition before us is one which possesses an interest not merely for the collector of varied specimens for pathological classification, but also for the practical surgeon who aims at restoring a lost function, in this case one of extreme importance. It is notorious that during the present century, if not before, operations have been devised, chiefly by French surgeons, for dividing prostatic enlargements from the neck of the bladder by cutting instruments introduced by way

of the urethra. These operations, it is quite certain, have not been attended with much success, although their partisans claim to have achieved excellent results by certain methods. Nevertheless I do not hesitate to make this statement, because nothing would be easier than to produce persons who, having lost for years the function of micturition, and having depended solely upon the catheter, had regained their natural power as the result of operation, were the assertions referred to trustworthy; and no proof would be so strikingly conclusive as the production of one such patient. Such evidence, however, has not been forthcoming; individuals have been met with, who, suffering from retention due to some temporary although chronic cause, were submitted to operation, and the results have been claimed as examples of successful treatment by operation on an hypertrophied prostate. But the ages of the patients relative to whom such a claim has been published, suffice in some instances to invalidate it, since the alleged subjects have often not reached the time of life at which prostatic hypertrophy occurs.

I shall not unnecessarily occupy our time by discussing this topic at length, having long ago satisfied myself as to the value of the claims made on behalf of the operation just referred to. But having again, and recently, had the opportunity of investigating the latest form of it abroad, where the practice is most advocated, I shall report the result of my observations in the following remarks.

First, there is no ground for believing that any section or resection, applied to cases of the enlarged prostate ordinarily met with, can be resorted to with fair chances of success for restoring the lost function of micturition to the subject of it. On the other hand, any incisions or resections in a considerably hypertrophied prostate, which are adequate for the establishment of a permanently patent passage, must be regarded as extremely dangerous.

Secondly, whether the obstruction be considerable, or whether it consist only of the little outgrowth which has just been described, when absolute retention has existed for several years, it is highly improbable that any operation, even if successful in removing the obstruction, will restore the natural power, and enable the patient to dispense with the habitual use of the catheter.

Thirdly, there is reason to believe that, in respect of the little

outgrowth just named, should it be dealt with during the early stage of its existence, a division of the tissues may overcome the obstruction, and restore wholly or partially the function of the bladder.

I think I may say that my friend, Professor Bottini, the well-known and accomplished Professor of Surgery at Pavia, whom I have recently visited there, strenuous advocate as he is for making a section of the prostate in chronic retention from hypertrophy, very nearly if not altogether agrees with me in these propositions. For he divides freely a prostatic growth when it is small; not, however, with the knife, but by means of the electric cautery, considering the latter a safer and more efficient agent than the cutting instruments which he and others formerly employed for the purpose.

Limited to the conditions named, I can conceive that the operation may be a legitimate one; but circumstances, so conditioned, are not of frequent occurrence, and, when compared with those which characterise the cases ordinarily met with, are very exceptional. Professor Bottini's proposal differs widely from those methods which had been previously advocated as applicable to ordinary cases of hypertrophy, without special discrimination or qualification, and which, I think, have been unwisely endorsed in various manuals by writers who have neither themselves ventured to perform operations by incision on the prostate, nor have investigated the results of them in the practice of others.

There is no difficulty to an experienced hand in dividing the neck of the bladder with an instrument terminating in a short beak placed almost at a right angle with the stem (the form originally employed by Mercier for incisions, and only a little more rectangular than the sound now used for stone), containing the stout wire through which the galvanic current is to pass. When the instrument is within the cavity of the bladder, the beak is turned downward behind the prostate; contact being then made to complete the current, the wire is drawn towards the operator, through the obstruction at the lower border of the neck of the bladder. The instrument is provided also with a small tube for a current of water to pass, and cool the outer part, or sheath, so as to prevent injury to the urethra by scorching.

Now, taking into consideration the degree of uncertainty

which must exist as to the exact physical condition of the neck of the bladder in some of these cases, it appears to me that a more certain diagnosis, and subsequently a more accurate division, if deemed necessary, might be achieved by making a small perineal opening into the urethra sufficient to admit, before operating, an exploration by the finger. The performance of this operation, which I have now so frequently made, and with results which have been reported in full in the preceding lectures, will, I believe, in future offer the most efficient mode of relieving such few cases as may be expected to profit by division, whether made by a cutting edge or by the heated wire. It has been shown that urethral section from the perineum is a proceeding almost without risk, while it affords the most desirable means of acquiring exact information relative to the part supposed to require division, and therefore the ability—which by no other means is attainable—of ascertaining whether any operation, and if so what, is necessary for the case in question. The patient, No. 41, in the series of cases just referred to, offers an example closely resembling the condition described. I incised the neck of the bladder for him on account of its extreme rigidity, the only abnormal sign I could discover, and the relief it afforded was very marked, and it has been permanent. But this was not a case of prostatic hypertrophy, nor had he reached the age at which it occurs.

I have briefly referred to the fact that, in order to warrant division of a prostatic growth, it must not only be small, but the obstruction produced by it must not have existed for any very considerable period of time. Supposing the bladder to have been wholly unable to expel the urine for a year or two, and the patient therefore during that period to have been compelled to rely solely on the catheter, it is necessary to bear in mind that the most complete division of the obstacle will probably fail to restore the faculty of micturating naturally. When the muscles of the bladder have long ceased to act, atony occurs, or at least loss of function; and the small prostatic outgrowth is no longer, as it formerly was, the only or the essential cause of incompetence. The condition now is really due to a powerless bladder, and not to obstruction at its outlet, and is nearly analogous to that of the patient who has depended for years for action of the bowels on a daily enema, and who, without it, is often incapable of passing a stool by any natural effort. The rectum becomes a recipient for

the contents of the bowels, but has lost the habit and the power of transmitting what is received; the same condition affects the bladder, the expelling function of which has been habitually performed by the catheter for a considerable time. This circumstance must be taken into account in considering the question of operating in relation to all these cases, or disappointment may arise after doing so, which might at least have been to some extent foreseen and provided against.

In relation to the second class of cases, viz. those in which impaired or lost vesical function is manifestly due to an injured or diseased nerve-centre, there is no occasion for discussion here: and they are mentioned chiefly in order to define the residue which after them will remain for analysis and consideration. The examples of this condition, which occur from sudden injury to the spine, and from advanced and obvious disease of it, are sufficiently familiar to us all. It is necessary, however, to be watchful for evidence of the presence of slight defects in the supply of nerve-power impairing the vesical function, and usually associated with other slight local signs, indicating that chronic change is taking place in some part of the nervous system. And there are also some exceptional modes of impaired function, occasionally to be met with, which, without the presence of such other signs, appear not to be explicable by any other hypothesis than that of arrested nerve-supply. Thus, a man, at or under middle age, states that for some time past the act of relieving his bladder has gradually required greater effort for its performance than formerly, so gradually that he does not know when he first noticed any change; that the stream has become habitually small; sometimes that the frequency has increased, sometimes the reverse, for he feels no want to pass it; generally he feels no pain; the urine is healthy in appearance, and by tests. The stream, moreover, does not cease definitely and unhesitatingly as in health, for after a little waiting and repeated effort, more urine can always be expelled, and the act may be considerably prolonged before the sense of having finished arrives, which, perhaps, after all, is not experienced. The local sensibility is diminished, for the consciousness of passing a stream is slight, a situation differing greatly from that which pertains to the small stream of stricture. Examination shows a healthy urethra, and can detect no enlargement or other physical deviation from the normal state of the bladder,

prostate, and rectum. There is no history of over-distension, but the catheter finds two or three ounces habitually remaining in the bladder after a prolonged attempt to empty it. No other sign of a lesion in the nervous system is discoverable. Such a patient must use an instrument in future to hinder the progress of incompetence, and to avoid the local effects of retained urine upon the bladder; and he may or may not regain power; in any case the improvement is slow.

Such a condition may turn out to be the beginning of a very grave history. It is possible that it may be the first indication of that affection of the cord known as Tabes dorsalis, since that malady is known in a few exceptional instances to be manifested by vesical incompetence at the outset, a symptom which appears at the close of the series of events which constitute tabes in the usual order of their development long after the gait and the vision have been affected. As Dr. Buzzard has pointed out, the absence of the patellar tendon-reflex in such a case would go far to indicate that the condition described was an example of tabes, a suggestion which finds confirmation in a case I have recently met with, and relative to which I am seeking clinical facts. But in a few instances the condition described may by slow degrees entirely disappear, and be forgotten. In the latter alternative may not the failure have been due to one of those local nerve-lesions which sometimes occur, and interfere with nutrition and function in various parts of the body during a time generally prolonged, and which slowly disappear, as, it may be supposed, the lesion in question becomes repaired? More observation of these cases is necessary before their true pathology is established.

But to all examples of impaired vesical function, although not considerable in degree, where the evidence of defective nerve-supply is sufficient, as well as to the very serious cases first referred to, the term 'paralysis of the bladder' is strictly applicable, in order to designate the condition of the organ; and to these the term should be strictly limited, for it is often erroneously used to designate vesical incompetence, no matter what has been the cause of that condition: a loose employment of the word 'paralysis,' which has often led to grave mistakes in practice.

Having thus eliminated from the list of causes of impaired function, hypertrophy of the prostate in all its forms, and all those of impaired nervous supply, we have now to consider what are

the remaining conditions which occur to render the bladder incapable of contracting sufficiently to expel all or any of its fluid contents. Certain of the conditions which belong to this group are, I think, less commonly recognised than those which have just been named; and, not being generally defined with accuracy, have been regarded as for the most part due to an affection termed atony of the bladder. This term has, in fact, become a convenient one, rather for the purpose of indicating that any given case does not belong to either of the two chief categories already briefly disposed of, than of affirming the pathological state of the organ to be that which the word 'atony' implies. In dealing with this residual group of cases now to be studied, I shall leave the consideration of atony in its restricted or true sense until the last, commencing with those conditions which most frequently occur, and which can be most readily verified as causes of vesical incompetence.

1. The first condition to be noticed is chronic inflammation affecting the tissues beneath or outside the mucous membrane of the bladder. And it is worthy of remark, that an inflammation affecting the mucous membrane only, impairs the function of the organ in a manner exactly contrary to that which is produced by the deeper inflammation referred to. That very common affection, ordinary cystitis, diminishes greatly, as long as it is present, the capacity of the bladder as a reservoir by impairing its first function, that of extensibility. Disturbance or movement of an inflamed mucous membrane excites pain, and the unfolding and opening out of the inner coat, necessarily produced by entrance of urine into the bladder, soon causes uneasiness; and this is instinctively avoided by repeated acts of micturition, which relieve the patient. Such attacks, as a rule, pass off and leave the bladder almost, if not quite, as complete in its functions as before. But when repeated attacks have taken place, or when there has been a prolonged continuance of inflammation in a chronic form, inducing extension of the morbid action to the submucous tissue and the muscular coat, and if this has become also somewhat hypertrophied, a thickened condition of the walls of the bladder results, in which the two functions of extending, and of contracting on the fluid contents are impaired, or can be very imperfectly exercised. Such a condition arises sometimes in cases of stricture, and may, indeed, be associated with any form

of obstruction or irritation affecting the bladder, when it intensifies greatly, if not prevented by treatment, what would not otherwise be a very serious condition. For when, in addition to the original local cause of the chronic cystitis, there is confirmed inability to empty the bladder, a condition mostly unsuspected at first, and generally insidious in its progress, almost any degree of aggravation may in course of time take place, producing decomposition of the urine, with muco-purulent deposit, separation of the phosphates of lime, magnesia, and ammonia, processes all occurring within the bladder, and due solely to the unnecessary detention of urine there. Usually in these cases, as in those which occur in prostatic retention, the frequent use of the catheter is essential, together with more or less daily cleansing, by gently washing out the bladder with some astringent or disinfecting solution, a proceeding which is too well known to be further alluded to here. I have verified a few examples of this conjunction of inflammation and hypertrophy affecting the walls of the bladder to such an extent as almost to destroy their mobility, and at the same time to diminish greatly the capacity of the organ. The result has been inability to pass more than a few drachms of urine naturally, while the portion retained also amounts in quantity to very little more, and seems hardly to repay the patient for using the catheter, which, nevertheless, it is highly desirable that he should do three or four times daily. In such circumstances urine is passed every half-hour or so, and the interval, after using the catheter, scarcely reaches perhaps an hour.

A still more rare condition, which I have met with in a case of long-continued extreme frequency of micturition, without obvious cause, and in which I explored the bladder with the finger by opening the urethra from the perinæum, is adhesion of adjacent surfaces of the mucous membrane at some points, doubtless a result, although an excessively rare one, of cystitis in some form. In this case I was surprised at the amount of separation I was able to make with my finger, doing it very gently and cautiously with not a little hesitation. The retaining power was somewhat improved, and the pain in micturition, which had been considerable, ceased after the operation. The case will be found in the series appended to the lecture which relates to digital exploration of the bladder (Case No. 12).

Another cause of impaired function of the bladder is chronic inflammation of the prostate and neck of the bladder, usually following gonorrhœa.

After aggravated and long-continued inflammation of the urethra, usually due to want of ordinary care, or to repeated exposure to fresh infection with irregular habits, or to abuse of instruments, inflammation of the prostate occurs, and gives rise to a more or less persistent induration and swelling of the organ. The nature of this enlargement is, of course, wholly unrelated to that which constitutes hypertrophy; but its effect on the function of the bladder in regard of ability to empty itself may be to some extent the same. Although the quantity of urine habitually retained in consequence of this condition is not large, the troublesome symptoms will persist, and tend to increase, if the fact of vesical incompetence is not recognised and met by an adequate use of the catheter. One of the most common forms of mucopurulent urine with unduly frequent micturition, commonly called 'catarrh of the bladder,' met with before and about middle age, originates in this manner; and the essential cause of the 'catarrh' is very frequently overlooked. The quantity of urine remaining in the bladder after natural expulsion may be only one or two ounces, or even less, and on this ground perhaps attracts little or no attention. However small the quantity, the only mode of putting an end to the patient's symptoms, and, indeed, of preventing their becoming more serious, is to insist on the introduction of a soft catheter at least two or three times in the twenty-four hours. The beneficial result will soon be apparent; but the catheterism must not be altogether dispensed with until the function of the bladder has been restored; and it will almost certainly be so, with a little time and patience.

Again, failure to empty the bladder sometimes accompanies the presence of calculus there, and may persist for a time after the calculus has been successfully removed by operation.

When calculus produces much pain in micturition—and pain as a symptom of calculus varies greatly in different cases—the patient sometimes learns instinctively, and quite unconsciously, to check the act of micturition before the bladder is empty, in order to prevent the severe smarting which occurs when, all the urine having been evacuated, the calculus remains in direct contact with the sensitive lining of the bladder. A habit of never

quite emptying the organ is thus acquired, and persists subsequently to the removal of the stone by lithotrity; especially if the bladder remains tender and sensitive after the operation. But when lithotomy has been resorted to, and consequently the urine issues for several days by a perineal opening, so that the bladder is necessarily rested and drained, the normal function gradually returns with the healing and closing of the wound, and the habit does not recur. The circumstance in question brings us to the consideration of a more important one, namely, the effect of lithotrity itself in impairing the vesical function—the two subjects being thus somewhat allied.

It is well known that one of the chief objections alleged against the removal of calculus by crushing has long been that, although the operation may have been successfully achieved, the repeated and prolonged use of instruments necessary for its performance occasionally produces serious subacute inflammation of the bladder, with more or less persisting impairment of the expelling function, and an obstinate tendency to deposit earthy phosphates.

The history of lithotrity shows the validity of the objection; but it shows also most unmistakably, that in proportion as the operation has been improved, so has the liability to the condition described been diminished. The greater the number of instrumental applications, and the longer the period devoted to their employment, the more severe and persistent is, usually, the cystitis—sometimes acute, mostly subacute—which has been thus aroused in certain exceptional cases. This question will be discussed more fully in another lecture; but it is alluded to here as an illustration of what has been often verified by me as a cause of impaired vesical function, namely, the rough or careless use of instruments in the urethra and bladder. This happens not infrequently for the proposed cure of stricture, when the obstruction is too heroically treated; the urethra being seriously, sometimes permanently, injured by instruments unnecessarily, not to say, absurdly large, and indeed sometimes employed when no stricture is present; for example, during the presence of gonorrhœa, when deep-seated inflammation is not infrequently set up, under which circumstances the injury inflicted has been wholly gratuitous and unnecessary.

In these unfortunate cases, of which I have seen too many, the

neck of the bladder is rendered unduly sensitive, the prostate is inflamed, it may be swollen, while acute pain is felt at the end of passing urine, similar to that experienced in vesical calculus. A not infrequent result of the painful condition described is that a small quantity of urine is habitually retained (just as in the cases of lithotrity referred to), a circumstance which is, no doubt, partly due to the instinctive action described above, and partly to inflammation and swelling at the internal meatus. But as in this form of cystitis, originating in abuse of instruments, there is generally no fear of the immediate production of phosphatic deposit, it is desirable to dispense with the use of the catheter for a short time if possible, and to rely on the effect of rest, hot bathing, and general management, in the hope that the effects of injury may disappear. If, notwithstanding such measures, some urine is still retained, a small soft catheter must be habitually used, with great gentleness, or recovery may not take place. There are few patients who require more care, attention, and gentle handling than those who have been the victims of imprudent or violent mechanical treatment. Against the gratuitous infliction of misery occasioned in this manner I have not failed to protest for many years, actuated by observation of many examples of it, which came before me at a very early period of my career. And although I am happy to believe that my frequently expressed opinion of the treatment referred to has not been without influence, I find to-day, by striking experience of very recent date, that admonition in regard of it is still necessary, although it is satisfactory to add that the examples of injurious practice referred to were not treated in this country.

I now come to the consideration of Atony, in the restricted sense of the term, as affecting the structures of the bladder. And I think it may be agreed that, although any tissues may be said, in a certain sense, to be atonied when by loss of nerve-power, or by the interstitial deposit of inflammatory matter, they are incapable of exerting their natural function, yet the technical use of the term 'Atony' here clearly is, to denote any incapability which may exist in the absence of such external influences as those described.

The inquiry then arises, is such incapability really to be met with? and, if so, under what conditions does it occur?

True atony is by no means uncommon as a complication of

other morbid affections of the bladder, and it sometimes occurs alone. Its presence may, in general terms, be affirmed when the coats of the bladder have lost both elasticity and contractility; the mechanical and the vital properties respectively of their component tissues; nervous function being intact, and no mechanical obstruction to the outflow of urine existing. The chief cause of this condition is long-continued over-distension of the bladder; and thus individuals of either sex, or at any age, may be affected by it. The exigencies of social intercourse, and other imperious necessities affecting individuals of both sexes, sometimes render relief of the bladder impracticable until some hours after the want has been declared. In the female sex the effects of parturition not unfrequently occasion a similar contingency. Whatever the cause, when the opportunity of relief is afforded, it may happen that no urine whatever can be passed; sometimes a small quantity issues, but with difficulty. In the former case—that is, when retention is complete—if a catheter is used at once, and with ease, the bladder of a young or middle-aged man usually before very long regains its natural tone. In the second case, where the bladder is relieved naturally, but with some difficulty, the patient usually avoids resort to artificial aid, believing it not to be necessary. Nevertheless, the bladder continues to be considerably distended, perhaps for days or weeks, the patient observing that, although he passes his urine very frequently, the daily quantity equals the average, which satisfies him. He is quite unaware that a constant quantity—perhaps a pint—remains continuously behind, and that the coats of the bladder are gradually becoming atonied through the persistence of mechanical distension affecting them. It is obvious that a resort to the catheter to place these tissues in a state of complete relaxation, at least three or four times in the twenty-four hours, is the first and most necessary condition in order to render possible a return of function to the over-distended vesical coats. If this treatment is pursued at a sufficiently early period, which differs greatly in different individuals, the power is gradually recovered, and no permanent injury results. If the daily catheterism fails after a trial of some weeks' duration to restore the natural function, and the quantity of residual urine continues as at first, or is not greatly diminished, a mild application of a galvanic current to the coats of the bladder offers a chance of hastening the cure. I may add that I have

little ground for confidence in the value of pharmaceutical remedies of a kind reputed specific in cases of true atony. That which improves the general health, as in all cases, will doubtless afford a degree of improvement in the local function.

Now it will be obvious that this condition of atony is often associated with hypertrophied prostate. Obstruction thus caused is the first step towards the production of an over-distended bladder, the tissues of which become atonied as a consequence, just as in the case above described. Hence we find the walls of the bladder, in old-standing cases of hypertrophied prostate, often much expanded and exceedingly thin; atony having become the essential cause of a persisting incompetence, which had its origin in obstruction at the neck. Hence it follows, as has been before shown, that no operation there would confer competence to pass urine on a bladder with these distended and atonied coats; a fact which appears to me not sufficiently regarded, but which receives fresh illustration from the considerations just named. In some cases of prostatic enlargement there is considerable hypertrophy of vesical coats, and in most cases of stricture the same phenomenon is met with; but in the former condition it occurs only when obstruction is far from being complete, and where a considerable degree of power is exerted in keeping open as far as possible the urinary outlet. When narrow stricture is present, still the urine is almost entirely expelled by the bladder, although with great effort; hence it is that in these circumstances hypertrophy is found largely affecting the organ. Hypertrophy implies, of course, activity of function in the tissues, and is the expression thereof. Atony necessarily issues in extreme thinning and wasting of the tissues. Of these two conditions numerous examples exist in our museum, and some are now placed before you.

There is one point only in relation to general practice which I think it is desirable to refer to, in regard of impaired function of the bladder, and that is the importance of looking for it in all cases of acute and exhausting disease of a prolonged character. I occasionally meet with a case of confirmed atony which has been evidently due to overlooked retention in the circumstances described. It is not common, however, and I by no means suggest unnecessary interference by way of research; but only that a watchful eye for retention should be maintained when patients

are for a considerable period of time in a semi-conscious state with delirium, or with extreme weakness.

It follows from all the preceding considerations, that our chief reliance for successful treatment in all the forms of impaired vesical function which give rise to retained urine, is the habitual use of the catheter. And I must add that the remedy is not only most valuable, but that it is for the most part indispensable, and the sooner it is employed in the great majority of cases the greater is the chance of ultimate recovery, in addition to the immediate relief which the instrument affords. The cases are much more numerous than is generally supposed, in which cystitis in various degrees of severity is produced and maintained by some incompetency in the retaining and expelling powers of the bladder. Such incompetency, although often deemed trivial in extent, must be recognised and dealt with, or the cystitis resulting from it will become chronic and confirmed, constituting the obstinate 'catarrhus vesicæ' of numerous authors. It is the frequent failure to perceive this fact, especially in relation with the less obvious forms of incompetence, which has led, as I said at the outset, to my choice of the subject. The failure is due not only to the oversight of the pathological condition which demands mechanical aid, but to the strong and very natural disinclination which so widely exists to the employment of instruments. I had almost added, to the prejudice which is entertained against them; and I fear that this also must be admitted. I cannot resist the temptation to cite in support of this statement an illustration which occurs while writing these very lines, and with an opportuneness which is remarkable, being in itself so completely appropriate to the subject. A distinguished foreign statesman, sixty-four years of age, called on me yesterday for the first time, to consult me after two years of continuous troubles from frequency of micturition, muco-purulent urine, the inevitable 'catarrh,' as it is termed, for which during that time he had been treated, notwithstanding which he had been steadily getting worse throughout. My first inquiry after hearing his story was: 'Has a catheter ever been used?' The reply was: 'No, indeed; my old friend and adviser'—giving the name of a well-known foreign physician—'has always said, "Whatever you do, never permit a catheter to be used; it is a machine which will create for you a worse malady than that which you already have!"'

Such is a type of the answers I have been accustomed to receive from foreign patients, and not unfrequently from my own countrymen.

The first sentiment which arises in my mind is astonishment that so grave a responsibility should be thus readily assumed by him who gives this counsel. Nevertheless, the frequency and the confidence with which it is tendered are very great; and I am bound to say that it has, within my personal knowledge, been the cause of many a premature and painful death. For when such advice is followed, the almost necessary, indeed the most common, result is, that the patient, after much suffering and long endurance, becomes at last affected with complete retention of urine, for which a catheter *must* now be passed for the temporary mitigation of his tortures, and to prevent immediate or impending death. But the catheter is at this crisis not employed in any sense for the purpose of treating the original malady, as at first advised, and for which such relief has come too late, and ere long the patient sinks. The slender consolation at least remains, that at all events his last few days were rendered tranquil and comparatively painless by regular instrumental relief. Nevertheless, one almost invariably hears that the original adviser vaunts his foresight, and cites the catastrophe as a fresh warning against the catheter, which—as he asserts, almost, indeed, with an air of triumph—'was so soon followed by a fatal result!'

Well, terribly unjust as this is, and hard as it is to bear, it must be avowed that the dangerous and unwarrantable aversion to the use of the instrument in many cases has not arisen without some sort of warrant from past experience in relation to catheterism; and this is the moral of my story, the facts of which are not exaggerated, and are such as I myself have, in varied form, but too often encountered. The surgical practice, at all events, which has preceded our time was not marked, in regard of the use of the catheter, by that gentleness and care, and by that choice of unirritating instruments, the value of which is now becoming recognised. The rigid metal catheters formerly adopted, together with the method of passing them, often studiously designed to exhibit the possession of rare dexterity, as indeed expressed by the very term 'tour de maître' used to denote it by the French—and mostly due to pretentious affectation—have in time past caused probably as much mischief as benefit to the subjects of it.

These fashions have, to a great extent, passed away; but the popular traditions and the popular distrust of instruments will long remain. The rule for the student's guidance which I have long held to be imperative, and the importance of which I have reiterated, and now again repeat, may thus be stated:—

The use of the catheter is in itself, to some extent, an evil; a very slight one if properly conducted, capable of becoming considerable in careless or unwise hands. A catheter is, therefore, only to be employed when the evil which is to be removed by its means may be regarded as more grave than that which is incurred by using the instrument; and such conditions as these are daily presented in practice. Let, then, every instrument employed be that which can be most easily passed, and is made of the least irritating material; always of course consistently with the efficient attainment of the object in view. Thus metallic or rigid instruments, as a rule, should only be used when those which are soft and flexible have failed; and for whatever purpose, they should not be larger than the needs of each case demand. Again, in washing out the bladder, in cases of chronic cystitis, the distension made should always be moderate in degree; and this slowly and gradually produced. By such gentle treatment a very considerable improvement in most cases is certainly attainable; and in the course of time the greatly exaggerated antipathy which widely exists against the use of instrumental treatment in the bladder will gradually but certainly disappear.

I have one more caution to utter in regard of habitual catheterism for those elderly patients whose circumstances have been above referred to, which is of great importance. When the bladder has for a long period of time been over-distended —the patient's condition having been overlooked for months, or even for years, in consequence perhaps of catheterism having been forbidden—it is, at this advanced period of the case, a serious matter to resort to it. Rashly undertaken, great as is the relief at first experienced, symptoms of fever—'urinary fever,' as it is, I think, properly termed—often appear in a few days; cystitis occurs, catheterism is required more frequently, the urine becomes highly purulent, the powers of life feeble, the tongue dry, nourishment is refused, and the patient sinks—usually in about three or four weeks from the first employment of the instrument. If an autopsy is made, almost invariably the ureters will be found

dilated on one or both sides; one of the kidneys diminished in bulk and wasted, the other enlarged, inflamed, and perhaps the seat of numerous deposits of pus.

It has been stated that such fatal histories following catheterism from long-distended bladder have occurred in individuals whose urinary organs, when examined after death, are found free from organic disease. Far be it from me to state that such a sequence of events is impossible; but it must be one of great rarity. No example has occurred within the range of my experience.

When a patient whose vesical functions have been long impaired requires artificial relief, the best chance of saving him is to enjoin at once the recumbent position in a warm and equable temperature, usually in his bedroom, in order that the skin may act freely, and that no locomotion may be possible. The catheter should be used skilfully and with great gentleness; not at first emptying the bladder completely, but always removing the instrument when pain is felt, as it often is before that condition is reached; and it must be applied again as soon as relief is manifestly required. I can scarcely overestimate the value of these precautions, nor advise too strongly the abstinence from movement and exposure of all kinds for a period of a few weeks in these particular cases. We may thus sometimes succeed in prolonging life, even at a very advanced term, and at the same time avoid the groundless but injurious opposition which is often manifested, as we have seen, to the use of the catheter; the want of which at an early period in the patient's history, and not the late recourse to it, has been the real cause of death in almost every one of the fatal cases described.

LECTURE V.

THE PROGRESS OF OPERATIVE SURGERY FOR STONE DURING THE PRESENT CENTURY, WITH THE MOST RECENT IMPROVEMENTS IN LITHOTRITY.

THE present century is old enough now to have acquired, from one point of view at least, a distinctive character. Whatever else it may be, it is an age of progress and change. It has witnessed the utilisation of steam as a motive force, and of the solar spectrum for chemical analysis; it has produced the railway, the magnetic telegraph, and the electric light.

At the same time, achievements not less important have marked progress both in the art and in the science of surgery; and I can scarcely offer a more striking illustration of this fact than is afforded by the recent history of a subject which, from the remotest antiquity, has occupied equally the literary power and the practical talent of our profession—that subject, indeed, which is, with your permission, to occupy our attention to-day.

The traditions concerning stone in the bladder and the history of attempts to remove it take us very far back into ancient history. Records which antedate the best epoch of Grecian art reveal what surgeons had even then achieved for the relief of the calculous patient. And anterior even to this—how much history fails to tell—it appears that an operation for stone was practised at some remote age of an early Indian civilisation, according to records not very long ago observed. I do not propose to trace that remote history, with the chief events of which we are all more or less familiar; but I will endeavour to recall very briefly the cardinal points of it which belong essentially to the present century; and I do so because it is extremely interesting to note the development, step by step, of the process now accepted as the best, and to observe that it is by a very gradual evolution that we have arrived at our present mode of practice.

In the early part of the century the only mode of removing a

stone from the bladder was by some form of lithotomy. In this country the high operation was adopted in a few instances, for example by Home and Carpue among others. But Cheselden's operation by the lateral method, performed throughout with the knife, or with the knife succeeded by the blunt gorget, was probably at this time employed by most surgeons, some still substituting the cutting gorget, usually Hawkins's, for the deep incision. But the mortality attending these operations was large even among the cases of children, greater than it had been in the hands of Cheselden, as appears from the result of a minute inquiry made by Mr. R. Smith of Bristol, and presented by him to the Royal Medical and Chirurgical Society in January 1820.[1] It was not surprising, then, that here and there men's minds were exercised with attempts to discover some easier and safer method than before of removing vesical calculi, at any rate when these were small in size. So we hear of instruments designed by Gruithuisen of Bavaria in 1813, by Elderton of Dumfries in 1817, and soon after of others by Amussat, Leroy d'Etiolles, and Civiale of Paris, all for the purpose of disintegrating the stone in the cavity of the bladder, so as to produce fragments which might be expelled by the natural efforts. In the end of the year 1820 Sir A. Cooper succeeded in removing a large number of small calculi from an elderly man with a pair of long curved forceps, by means of which he seized and withdrew them through the urethra.[2] But in the preceding year the same surgeon had removed a stone, said to be as large as a small walnut, through a limited perineal incision

[1] Mr. Smith's paper, which is the first in the volume, contains all the reports, obtained with much labour, from about thirty-four principal cities and towns in Great Britain. The chief of these were Norwich (by many degrees the most important), Bristol, Leeds, Bath, Exeter, Manchester, Birmingham, and Sheffield. Taking the mortality at all ages in the gross—that is, including the cases of children, which formed a considerable proportion—the deaths were about one in four cases, elsewhere than at Norwich, where they amounted to about one in seven. Such was the provincial experience of the operation during the end of the last century and the commencement of the present century, that is, prior to 1820. Some of the facts detailed, such as the absence of an operator in important districts, and the want of any knowledge as to the prevalence of stone in others, are very striking. This volume contains several contributions to the literature of our subject, among them well-known papers by Mayo of Winchester, Earle of St. Bartholomew's, Astley Cooper, and Martineau of Norwich.—*Trans. Royal Med. Chir. Soc.* vol. xi.

[2] Sir A. Cooper's paper in the same volume was read Feb. 1821. This method had been employed probably several centuries before; but it had long been forgotten and disused, so that it was practically a new procedure.

of the urethra, after dilatation had been made of the opening, including the neck of the bladder, by Dr. James Arnott with his water dilator.[1] Then, in January 1824, Civiale achieved a great success by safely reducing calculi, through the agency of a species of drill, the 'trilabe,' within the bladder, to fine débris, and removing it, in the cases of two patients, at several sittings before a committee of the French Academy. Universal interest was excited in this new process of pulverising a stone, an operation to which he gave the name of Lithotrity; and this name has ever since been retained to mark the essential distinction between the process of mechanically disintegrating the stone within the bladder, and that of removing it entire through an incision made for the purpose, and usually known as lithotomy. Almost at the same time an instrument for crushing by pressure between two short blades (a mode which has been maintained with very little change to the present time) was designed by Mr. Weiss of London. This instrument was some years afterwards adopted by Baron Heurteloup, who employed a hammer as the motive power, attaching both the patient and the lithotrite to a special couch; and it was not until several years later that he exchanged the hammer for the screw, which had been suggested by Hodgson of Birmingham at a very early date. With the increased power of crushing thus obtained, the removal of fragments by artificial means soon became necessary, and was effected more or less efficiently by forcible injections of water through large evacuating catheters with capacious eyes for the entry of fragments; and this process was now regarded as an essential part of the operation. Heurteloup not only employed it largely, but at a later period adopted also a hollow-bladed or, as he called it, 'duck-billed' lithotrite for the purpose of removing all the fragments, when possible, at one sitting, an object which he regarded as important, and indeed as essential to success. There is a remarkable passage in his later writings advocating complete removal of the stone at one sitting, which I have rendered from the original French, as follows: 'So long as lithotrity has not succeeded in curing patients promptly, it is imperfect, and I propose to submit to you other works, with the object of arriving at perfection. In these subsequent works I

[1] This operation, to be followed by dilatation with sponge tents for the removal of the stone, had been proposed by Douglas, nearly a century before. *Phil. Trans.* 1727. Rude attempts of a like kind were made, ages ago, in the East.

shall treat of processes by which lithotrity may accomplish its two final objects, i.e. the immediate and complete removal of the stone, and the immediate and complete pulverisation of the same. I shall endeavour to demonstrate, in the part which will treat of the former question, that it is a great error in lithotrity to break up a small stone in the bladder, and to leave there the fragments which are so readily detained in the sinuosities and irregularities of the lining membrane, irregularities which are so often numerous and deep. I shall prove that it is necessary to extract these small stones, and send away the patient cured at once.'[1]

These views of Heurteloup were evidently in advance of his age; the time was not then ripe for this last improvement. For anæsthesia had not yet become the familiar of operating surgeons, and his theory, which was identical with that of to-day, was unfruitful, since the realization of it would have been almost impracticable for suffering and sensitive patients. During 1829 and some subsequent years, Heurteloup performed numerous operations in this country, mostly with the early instruments and hammer, demonstrating his method in public and in private before the leading London surgeons. Among those of our own countrymen, Robert Liston was the first to perform lithotrity, which he did with the trilabe of Civiale, in the autumn of 1827, but he was compelled to finish the operation by lithotomy.[2] In the following autumn (1828) he was successful in a case by the new method.[3] Keith of Aberdeen performed his first two cases with Heurteloup's bed and apparatus in 1833, as also did Liston.[4] Sir P. Crampton, in Dublin, soon followed, operating on twenty adult cases between 1834 and 1845 with excellent

[1] *Mémoire à l'Académie Impériale de Médecine de Paris*, 1857, by Baron Heurteloup, pp. 38, 39: 'Tant que la lithotritie n'est pas arrivée à guérir promptement les malades, elle est imparfaite, et c'est pour arriver à sa perfection que je me propose de vous soumettre d'autres travaux. Dans des travaux subséquents je traiterai des procédés par lesquels la lithotripsie peut arriver à remplir ses deux buts finals: l'extraction immédiate et complète des pierres et leur pulvérisation immédiate et complète. J'essayerai de vous démontrer, dans la partie qui traitera de l'extraction immédiate et complète, que c'est une grande faute, en lithotripsie, de briser une petite pierre dans la vessie et de laisser dans l'organe les fragments qui peuvent s'y perdre dans les sinus et les anfractuosités de la membrane, sinus et anfractuosités qui sont souvent, comme vous le savez, profonds et fréquents. Je vous démontrerai qu'il faut extraire ces petites pierres et renvoyer immédiatement le malade guéri.'

[2] *Edinburgh Medical and Surgical Journal*, vol. xxix. p. 222.

[3] *Ibid.* vol. xxxi. p. 299.

[4] *Ibid.* vol. xl. pp. 480–85.

results. He also endeavoured to remove the fragments artificially, and was the first to use for that purpose a vacuum glass receiver, which he successfully employed in the year 1841.[1] In London, Sir Benjamin Brodie became at an early period convinced of the value of the new operation for small calculi, to which he was disposed to limit its application. He appears to have commenced about the same time as Crampton; for in the year 1855, when he was relinquishing the more active duties of professional life, he presented to the Medical and Chirurgical Society an account of his lithotrity practice, which covered a period of about twenty years. He there speaks of the operation as 'hitherto adopted only to a limited extent by British surgeons,' stating that during the time named he had operated 115 times, but not on that number of individuals, one having been operated on eight times in as many years, while several others had a calculus removed two or three times. Among this number nine deaths occurred, and he claimed as his result a numerical proportion of one death in twelve and a half cases, or 8 per cent. He stated, by way of comparison, that the recognised mortality from lithotomy, *at all ages*, was then, as at the time of Robert Smith's inquiry above referred to, not less than one death in six cases; and he concluded by stating that 'lithotrity, if prudently and carefully performed, and with a due attention to minute circumstances, is liable to smaller objection than almost any other of the capital operations of surgery.'[2] But, during the same period, other operators, more adventurous, tested the crushing method by applying it to all cases, including those with large and hard stones, and thus unhappily attained a higher rate of mortality than that which attached to the old procedure. And thus, in some quarters, lithotrity had fallen into disrepute, and a considerable reaction against it had taken place. Not only was it frequently fatal in the old-standing cases referred to, but when the patient had survived the repeated sittings, and the irritation produced by very large instruments, sometimes not too gently used, chronic cystitis and phosphatic deposit often rendered the patient's life miserable; a painful condition which became hence-

[1] *Dublin Medical Journal*, 1846, vol. i. p. 43, Case No. XIV. of the series. On October 1, 1841, Sir P. Crampton used the 'exhausted ball' with success, Mr. Liston (afterwards surgeon to University College Hospital, London) 'present.' This paper records the details of the twenty cases referred to in the text.

[2] *Med. Chir. Trans.* vol. xxxviii. p. 194.

forward the special opprobrium of the operation. Meantime, those surgeons who had never been convinced of the value of the crushing operation were endeavouring to compete with it by improving the methods by cutting; and a simpler and less dangerous operation, as it was thought, came into vogue, viz. Median Lithotomy, adapted particularly for those small stones for which lithotrity was, if for any, now capable of providing. It was to some extent a revival of the Marian operation, but without the mechanical appliances for distending the wound, which would, of course, be unnecessary for small calculi, and it became more or less popular from 1840 to 1860 or 1865. But Brodie's paper just referred to gave a decided impetus to lithotrity, and, among others, Mr. Skey and the late Mr. W. Coulson sought every opportunity of testing it in suitable cases. It was about the same time that the latter engaged Civiale to operate on a patient here, and Civiale's method and instrument greatly impressed the English surgeon. It was impossible for those who saw the operation not to admit the superiority of the French lithotrite to the old screw pattern used to the last by the revered master of St. George's. Mr. Coulson at once adopted it, and employed it with success in a good many cases during his later years; and I was so strongly convinced of the value of the instrument and the method in some of those cases which I had the opportunity of observing, that I went to Paris, and offered myself as a pupil to Civiale for the study of his method, and was at once accepted, and henceforth to the end of his life was treated by him with the greatest kindness and confidence. I trust it may not be without interest to us, who know and share alike the experiences of professional life, if I venture to relate an incident regarding my old friend Civiale. When it fell to my lot, in 1863, to remove from a well-known and distinguished patient in a neighbouring country a large and obstinately retained fragment, which had not been previously so placed as to yield to my master's hand at some preceding trials, I instantly telegraphed him, knowing that he was anxious as to the result: 'My dear master, you have succeeded here to-day by the hands of your grateful pupil.' Civiale was, I think, scarcely less pleased than myself, and became more my friend than ever. He mentioned the fact in the Academy of Medicine in Paris, and very soon afterwards presenting one of my works there—it was my work on the prostate—

claimed for it, without prior communication with me, a prize just then about to come due of 1,500f., and which was forthwith granted. I trust I may be pardoned this digression as a tribute to the amiable disposition of one whose name will always be connected with one of the greatest surgical achievements of the nineteenth century. From that time my own experience rapidly enlarged. The cylindrical handle, a design which was made by myself and carried out by Messrs. Weiss, rendered the lithotrite more manageable than before, and was accepted by Civiale for his own use, two instruments being made for him here not long before his sudden and lamented death. Whatever other modification has been made, the form referred to is, I think, still almost universally retained.

Leaving for the present all reference to the instruments employed, we come now to the principle of action adopted by the originator of the operation and by his early followers. Civiale commenced his work, and did the greater part of it, before the advent of anæsthesia; and he did not regard the new agency with a friendly eye. His light and sensitive touch, equally appreciated by the patient and admired by the pupil, appeared to have lost some of its value when the former was unconscious under the influence of ether. Moreover, he liked to be able to gauge the sensibility of his patient, watching his expression while sliding the lithotrite into his bladder, and thus estimating how far the manipulation might be carried at that sitting. Civiale's method was to crush little and often; to produce fine débris and let them quit the bladder, if they would do so, by nature's efforts; if not, he would render assistance by injecting water through the evacuating catheter. The patient was kept chiefly in the recumbent position, and rest was enjoined between the sittings, in order to avoid irritation from the inevitable fragments. The doctrines of this school long time prevailed; for the master's success was greater than that of any of those who, less careful to ensure favourable conditions, to select light and small lithotrites, to employ delicate manipulation, and to enjoin continued rest and quiet for the patient, met with a considerable number of fatal cases. Solicitous, before all other things, to secure a favourable judgment from the profession for his pet operation, he could not admit that it ever occasioned death. The defence of this untenable dogma was his one weak point, pardonable only to the indulgent father

of such an offspring, and in order to support it he was careful to account for a fatal issue by any theory rather than that which blamed the lithotrite. And perhaps he was less wrong than we have sometimes thought him to be: his over-anxiety to defend lithotrity having undoubtedly overreached the mark and damaged his cause. For when a case of stone—behind which lie masked renal organs already fatally damaged by years of irritation—is attacked by the lithotrite and death ensues at no distant period, the fatal result has only been hastened by the laudable but perhaps hasty attempt to save a patient's life already doomed beyond help of man. Not lithotrity, but the long presence of calculus, has sapped that patient's life;—at an earlier stage the operation might have certainly saved him, and not the operation, but the want of timely recourse to it, has been the real cause of death. Nevertheless, if the surgeon through rashness or want of insight, or more likely still through a chivalrous attempt to save a fellow-creature, however slight his chance, consents to operate in such a case, the operation is discredited; and we expect him to inscribe that case on his list of fatal issues attributable to the operation. This is the tacitly accepted and only honest system to follow, and my own cases hereafter to be presented to you have been subjected to the ruling of this rigid law. In this cautious school of operating I was trained, and pursuing it here found it remarkably successful; for I obtained, after my first fifty cases were over, a hundred lithotrities on elderly men with only 5 per cent. of deaths. Like Civiale, I adopted at first for hard calculi, estimated to be upwards of an ounce in weight, the medio-bilateral lithotomy which he always employed, subsequently returning to the lateral operation as on the whole preferable for really large formations. Civiale's method, as above described, was followed about this period, with little deviation, throughout Europe, wherever lithotrity was accepted.

But in about 1864–5, Mr. Clover designed his aspirator, in which an india-rubber bottle was the agent, first, for injecting water to stir up the débris after crushing, and then to produce a powerful current out of the bladder, by which they should be withdrawn. This proceeding I found more painful to the patient than the action of the lithotrite, and used it occasionally, chiefly when exceptional circumstances led me to employ chloroform; for as I was at this period operating by frequent short and nume-

rous sittings, I preferred to dispense with the anæsthetic agent. The circumstances which now chiefly led me to use both chloroform and the aspirator freely, were, unusual pain, frequency of micturition, much muco-pus in the urine—in short, cystitis—and also prostatic enlargement and inability therefrom to empty the bladder. When a case exhibited these conditions, instead of combating the symptoms by the reputed remedies for cystitis, I—as it was then thought boldly, if not somewhat rashly—summoned Mr. Clover to give chloroform, and emptied the bladder, if it were possible to do so, by a prolonged crushing, followed by the aspirator. This was exactly contrary to the practice in France at this time, that is to say between 1866 and 1870, during which period I had employed aspiration 'some two or three hundred times,'[1] and I was at some pains to combat the resting or expectant treatment still pursued there. I remember to have endeavoured, on more than one occasion, to illustrate to my friends in Hôpital Neckar, in Paris, the remarkable results which were to be obtained in combating cystitis by the lithotrite and aspirator, rather than by rest, medicine, the hot bath, &c., operating there on a patient in the service of Professor Guyon, in the autumn of 1879. In 1871 I made anæsthesia the rule and not the exception in operating, and used the aspirator more or less constantly, with evacuating catheters, generally Nos. 13 and 14 of the English scale. By this means a uric acid or oxalate of lime stone of moderate size was easily removed in one sitting, and it was our practice here in London thus to dispose of a small example. When the stone was of medium size, two or three sittings were deemed necessary; and when a really large one was attacked, four, five, or six sittings, with intervals between each of three or four days, were devoted to the task. At least double the quantity of débris, often more, was made and removed at this period, as compared with the amount so dealt with by Civiale at the close of his career.

In this place I may appropriately advert to the long and early experience of our late and universally esteemed President, Sir

[1] *Lithotomy and Lithotrity*, 2nd edition. The above statement appears at page 215, and was written in 1870; full instructions for using the apparatus, with drawings, appear in this edition. The earliest notes I have of applying the aspirator in order to remove a large quantity of débris in the circumstances described, are for the case of a Mr. Milward, on June 16, 1866: he was sent to me by Dr. Heslop of Birmingham, and Mr. Clover administered the chloroform on that occasion.

William Fergusson. I propose to give you important details of his experience, as also of that of a well-known surgical celebrity of the north, Keith of Aberdeen, in my next lecture. Related closely to the topic under our consideration now, is the early adoption of anæsthesia by Fergusson, with the object of emptying the bladder of a crushed stone if possible at a single sitting, in withdrawing fragment after fragment by means of long and slender lithotrites through the urethra. Desirable as was this object, the mode of attaining it which he adopted, I must here say, as I have often emphatically said (to none more so than to himself in friendly conversation), was not a desirable one. The risk of injury to the urethra was greater than the gain by way of relief to the bladder; but the attempt is named here as another illustration indicating the historical growth of the idea which Heurteloup enunciated, viz. that, in order to render lithotrity perfect, the bladder ought to be emptied of its contents at one sitting, as completely as it is in lithotomy.

Meantime, while lithotrity with some slight modifications, in the hands of different operators, was answering admirably for the small and middle-sized calculi, the problem of how best to remove the large ones had not much advanced towards solution. The median and medio-bilateral operations, as well as the prerectal operation of Nélaton, were all manifestly inadequate for stones weighing two ounces and a half and upwards, while the lateral operation for such stones was notoriously a formidable ordeal for the patient. Hence Dolbeau of Paris laboured hard at the improvement of an old idea, to his version of which he gave the name of 'perineal lithotrity,' endeavouring to succeed better than before, by crushing the stone through a small perineal opening of the urethra in front of the prostate, followed by preliminary forcible dilatation, made by expanding metal rods, of the neck of the bladder, after which he removed all the fragments by forceps, and terminated the process at one long procedure. It cannot be said that his short experience was very favourable, or that it appeared to be as hopeful to others as it had been to himself. He died at an early age, and with him the practice he advocated ceased. Unexpected combinations of the knife and the lithotrite occurred sometimes under unforeseen circumstances; and in this way a precedent has occasionally arisen which may be usefully followed when such circumstances again occur. Thus, on August 5, 1878,

I was crushing, for a patient *who passed all his urine by catheter*, a stone of rather large size, and was removing by Clover's apparatus a considerable portion, finding the bulk of it, however, larger than I had expected. I then remembered that this patient might have great difficulty in using his catheter after the operation, or in having it used for him by a nurse, on a demand occurring every two hours or so at the least, as would probably happen. I therefore at once put him in the lithotomy position, made a small opening into the urethra at the membranous portion, through which, with a small forceps, I extracted all the remaining débris I could find, and tied in through the wound an india-rubber tube, to establish an exit by that route for all the urine. The result was every way admirable. Mr. John Morgan, now of Grosvenor Street, was present, assisting me on that occasion.

To return to our history. Thus far it has been my object to make a rapid sketch of the general practice in relation to the surgical treatment of calculus in the chief capitals of Europe up to within about the last five years. But in 1878 Professor Bigelow, of Harvard, U.S., proposed a further and a considerable advance in regard of the amount of crushing and aspiration which might be employed at a single sitting. Whatever the size or the nature of the stone, provided only that it was deemed to be within the compass of our power to crush, he advocated, on principle, that the whole should be removed at once, and no portion be permitted to remain, so far as the operator knew, for a second attempt. The principle enunciated was, that broken fragments remaining in the bladder were more injurious to it and more dangerous to the patient, by causing cystitis, &c., than a prolonged sitting and a very considerable amount of mechanical interference expended on the task. This apparently bold proposal took many by surprise. It was not that the removal of a calculus at a single sitting was by any means a novelty in itself; small ones had been often thus disposed of. It was the proposal to deal with stones of very considerable size, and the prolongation of the sitting from a short term of minutes to one which might, according to the Professor's experience, occupy two hours, or even more, which naturally aroused much question. Nevertheless, I must avow that my experience of the value of removing all the fragments from a bladder when acute cystitis was set up, had disposed me to receive the new doctrine with

favour. Hence I at once put it to the test, and, without any change of instruments, proved its value in the first twenty cases which I treated by this method. Professor Bigelow had, however, made a further proposal, namely, that much larger and more powerful instruments, both lithotrites and evacuating tubes, should be employed than heretofore. These proved to be not only, for the most part, unnecessary, but to be sources of danger, especially in unpractised hands. The American surgeons, as we have already observed, had long been accustomed to use instruments in the treatment of stricture much larger than is deemed either necessary or desirable by surgeons on this side the Atlantic; and this fact has had the advantage of facilitating the production of Professor Bigelow's proposal. No doubt heavy and formidable crushing machines become absolutely essential to success in dealing with those exceptionally large calculi which have hitherto been relegated to the cutting operation, but to such rare examples only should they be applied.

A minor but not altogether unimportant proposal of Professor Bigelow was to change the name of the operation in future from lithotrity to 'Litholapaxy.' His procedure, however, introduces no mode of action not employed before. Bigelow's achievement has been to demonstrate that crushing a stone, even if large, and removing all the fragments from the bladder at one sitting, is a safer proceeding than dividing the work between two, three, or more sittings. The value of this principle was perceived and insisted on, as we have seen, by Heurteloup thirty years ago, but he failed for want of anæsthesia. And it is a curious fact, too, as an illustration, if one were necessary, that the principle of evacuating the stone largely, as a part of the operation of lithotrity, is in no respect a novel one, that Heurteloup himself endeavoured, at the close of his career, to change the name of the proceeding on this very ground, viz. that he not merely crushed the stone, but that he also evacuated the débris artificially as completely as possible. The term which he desired to substitute to denote his method of crushing and evacuating the bladder, was 'Lithocénose,' from λίθος, a stone, and κένωσις, extraction.[1]

[1] 'L'évacuation rapide de la vessie préoccupait si bien Heurteloup qu'il traduisait sa pensée par un mot nouveau, celui de lithocénose (λίθος pierre, et κένωσις extraction), expression curieuse à rapprocher de celle de litholapaxie que propose aujourd'hui M. Bigelow.'—*Des Modifications modernes de la Lithotritie*, par le Dr. Kirmisson, Paris, 1883, p. 4.

Nevertheless he signally failed to do so, although the proceeding was really then, to some extent, a new one, and the original term, lithotrity, still remained as it does to this day. And there is an equal disinclination among many surgeons, foreign and English, to admit a similar change now, it being evident to every one who knows anything of the history of lithotrity that evacuation by artificial means has been an essential part of the procedure for at least fifty-five years, and that this part has steadily grown in importance in a direct ratio with an increasing ability and determination to crush more largely than before. Five years of experience of lithotrity completed at a single sitting enables me to speak more decidedly of its capabilities at this moment than perhaps any other operator. It has been only partially tested at present on the Continent; entertained very cautiously, I may say only partially, at Paris; but received with gradually increasing favour at Vienna, where it is now the rule; but it is not in either place accepted for the largest calculi, and a cutting operation is preferred for those hard stones which weigh one ounce and a half and upwards in size.[1] To this fact I shall hereafter refer, for I will not quit our present subject without making some brief statements relative to my own experience of the one-sitting operation, which I have adopted in the last two hundred cases to use round numbers, consecutively operated on by myself.

I propose, however, first and briefly, to describe that mode of proceeding which has appeared to me to be the most desirable in order to achieve successful lithotrity at a single sitting. We will commence by examining the instruments necessary for the operation, and then consider the method of employing them best adapted to effect our purpose.

In the first place, in respect of all instruments, we must recognise the importance of not inflicting any needless injury on the urethra and bladder, and should, therefore, always select the smallest lithotrites and evacuators which possess strength and capability adequate to crush and remove the individual calculus to be dealt with. And inasmuch as the great majority of calculi are small when first found by the surgeon, undue stretching of the natural calibre of the urethra is unnecessary for their removal,

[1] *Ueber das Verhältniss der Litholapaxie zum hohen Blasenschnitte.* Von Professor v. Dittel in Wien, aus Dr. Wittelshöfer's *Wiener medizinische Wochenschrift* (No. 3 und Fortse'zungen, 1884).

since no instrument need be used which exceeds the limit of that calibre. It is only when dealing with calculi of exceptional size, that instruments which distend the urethra to a considerable degree are to be employed.

Secondly, in dealing with a calculus of any size, but especially when large, it is important to employ instruments which are simple in construction and not easily liable to be deranged in action when employed in the bladder. The presence of débris in quantity, mixed with viscid mucus, perhaps with some coagulated blood, has to be reckoned on in circumstances which demand prolonged manipulation; and mechanical arrangements which work admirably in experiment with limpid fluids outside the bladder are not unlikely to fail when brought to the test of actual service. Simplicity in the construction of instruments is, therefore, to be attained if possible.

Let me suppose that the presence of a calculus has been determined by sounding in the bladder of an elderly adult male. It is almost certain that the note obtained and the resistance felt in making contact, generally suffice also to convey an idea, approximately accurate, regarding the size and nature of the stone. As a rule, it is not so necessary now as it formerly was to make an exact diagnosis in relation to those particulars. When it was desirable to limit the application of lithotrity to calculi of, say, one inch and a half diameter, it was important to ascertain, by some easily managed method of measuring, what were their dimensions in every case. But now that the scope of lithotrity is, beyond all question, considerably increased, all that is requisite to be learned is, whether the stone is an exceptionally large and hard one, and whether any unnatural narrowing of the canal is present; and both these points are almost sufficiently determined by an ordinary sounding in practised hands. At all events it is unnecessary, and therefore, I think, unwise, to make any further examination for the purpose of diagnosis until the patient has been placed under the influence of an anæsthetic upon the operating table, the surgeon having full liberty to exercise his judgment and act as circumstances demand.

Invariably, as soon as the patient is thus prepared for operation, I pass a full-sized conical steel-plated sound, say about No. 15, English scale (see fig. 18), in order to determine that most important point of urethral calibre before touching the stone. If

the urethra is healthy—and of course in the very great majority of cases it is so—the instrument has passed with perfect ease, and may, if the stone is rather large, be further tested to even 16 or

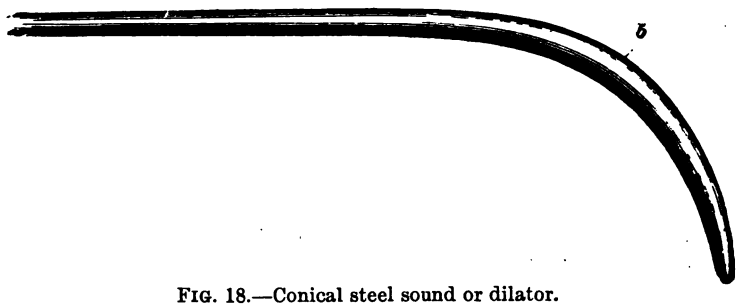


FIG. 18.—Conical steel sound or dilator.

17. I am speaking of the elderly adult; by that term I mean a man of sixty years and upwards. I am sure the urethra is more capacious—that is, it is more readily distended, an act which may involve slight splitting of the superficial layer of its mucous lining, generally a harmless proceeding within certain limits—in such patients, than in those whose age is between thirty and fifty years. In these latter, the urethra often resents any active distension, and the bladder also more readily becomes inflamed than in older patients. With a urethra admitting the easy passing of No. 16, almost anything is possible; since 17, or even 18, may safely follow, should it be desirable to go thus far. No. 16 suffices for almost any calculus; but if I am dealing with one which weighs, in my judgment, about two ounces and more, I am glad to use the larger sizes named; and No. 18 I have never found it necessary to exceed. But if the stone is known to be small, No. 14 amply suffices, and there can be no reason for going beyond it. This is the size which was mostly used with the original instrument of Clover in 1866, and for all ordinary purposes answers admirably.

The lithotrite is next introduced. With small and medium-sized stones, a light instrument of the half-fenestrated pattern—that is, the lower portion of the male blade penetrating the female blade, which prevents the possibility of blocking by débris, while the upper portion is flat and crushes the stone into small fragments—is, I think, the best (fig. 19). This mode of construction is applicable for a wide range of size in calculus, answering for any one of uric acid below about an inch and a half in length.

To accomplish the first fracture of such an one, or to crush into fragments a larger calculus, a fully-fenestrated lithotrite is better.

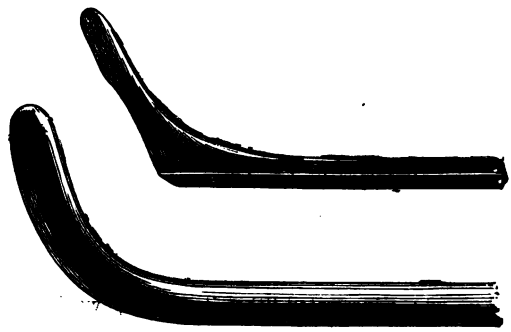


FIG. 19.—Half-fenestrated lithotrite.

There are some old forms of blade which have been in use for fifty years, which cannot, I think, be excelled; so numerous are the patterns which have been employed, that it is difficult now to imagine a new design.

The size and strength of the lithotrite, as before said, are to vary with the nature and size of the stone to be crushed. I have here the patterns which I habitually use (figs. 20 and 21). Supposing, then,

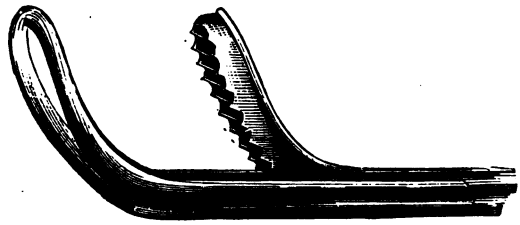


FIG. 20.—Ordinary fenestrated lithotrite: an excellent model.

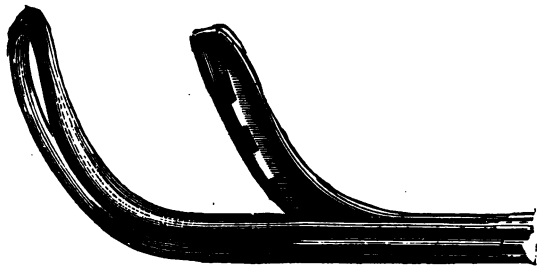


FIG. 21.—Another excellent model.

that a considerable quantity of débris has been made, the calculus being large, it is advisable to withdraw the lithotrite, to introduce

an evacuating sound, and attach the aspirator, so as to withdraw the débris made before crushing more. When this is removed, I

FIG. 22.—Fenestrated lithotrite: very powerful.

choose a lighter instrument to crush the fragments into débris, and again use the evacuator. By this time, probably, the remaining portion is not considerable, and another introduction of the lithotrite, followed by another aspiration, very likely empties the bladder. If, however, a fragment or two are heard and felt to strike the end of the evacuator, yet do not pass through it,

FIG. 23.—The cylindrical handle, best adapted for fenestrated instruments.

they are probably just too large to issue, and require another crushing before the task is completed. There is little difficulty in getting rid of the last fragment when a good aspirator and a No. 16 evacuator are at work; both finding and removing are better accomplished thus than by any other means, given the aid of a light, handy lithotrite to reduce any remaining portion to the appropriate size.

In regard to aspirators, the original instrument of Clover, simple in the extreme, and almost clumsy, is nevertheless a very good instrument, and requires only some modification to be as efficient as most of the modern ones. For my own aspirator I have provided a tap with funnel-shaped opening to the upper part of the india-rubber ball, by which to fill it, and to remove air accidentally introduced, with decided advantage; and have increased the size and power in order to deal with larger stones than before. Last year I attached to the end of the evacuator in

the interior of the glass receiver a light wire valve, which, while it admits any fragments to enter, renders their escape impossible; its action meantime being always visible to the operator (figs. 24 and 25). There is certainly now no difficulty in removing any last

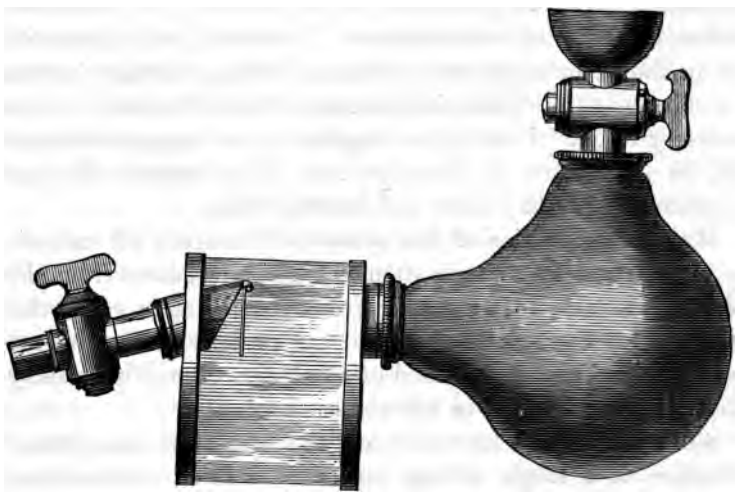


FIG. 24.—The author's latest form of aspirator, with wire valve in glass trap.

fragment from the bladder, the more powerful aspirators emptying the cavity so efficiently that no other instrument is necessary for the purpose: while by no sound is the last fragment found so well as by the evacuating catheter, against which contact of the

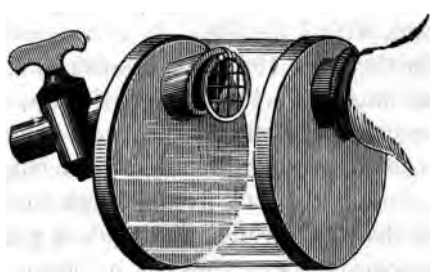


FIG. 25.—The glass trap separately, to show action of valve.

fragment is certain to be felt or heard, through the action of the outrushing current of water. After the operation the patient remains in bed, and rarely requires any special management, except sometimes that which a simple traumatic cystitis demands,—namely, absolute rest in bed; occasionally the urine neutralised by potash; hot hip baths, mild diet; and watchful care that

chronic retention of urine does not occur, or is not permitted to continue unrelieved; avoiding on the other hand undue or unnecessary interference by means of catheters. But of all the agents for rapidly removing subacute or chronic cystitis after lithotrity, nothing equals mild injections of nitrate of silver, the effect of which is sometimes almost instantaneous. I use only half a grain of the salt in four ounces of warm water at first, gradually increasing to a solution three times that strength, beyond which it is rarely necessary to go. Usually one application a day, sometimes two, will, in the course of three or four days, remove the painful symptom and produce clear and healthy urine.

My own experience of the system of treating all calculi but the very largest by a single sitting of lithotrity, dates from shortly before Christmas, 1878; the first example being a case which I saw with Sir Spencer Wells, who was present at the operation, when the bladder was emptied of a calculus of medium size by the lithotrite and aspirator in less than ten minutes.

Since that time I have adopted the system of completing the operation at a single sitting for every case in which lithotrity appeared to be possible, with two exceptions only, to be described immediately.

The total number of adult male patients on whom I have operated in the period referred to, a term of rather more than five years, is 211.

Of these, 15 have been by lithotomy, being of course the most unpromising cases, with 7 deaths.

There remain therefore 196 cases treated by lithotrity.

One of these was a Portuguese gentleman, No. 535 in the catalogue of the calculi in my cabinet now before you, to whom Mr. Clover thought it prudent to administer chloroform only for a very limited time. He had five sittings to remove a stone weighing no less than 787 grains, and made a good recovery.

The other exception was that of a large oxalate of lime calculus, No. 538, in March 1880, which at that time I preferred to crush in four sittings. The débris weigh 640 grains. He is now perfectly well.

Every one of the others has been treated at a single sitting, and make 196 cases, with 10 deaths, or just 5 per cent.

Total of 211 cases of adults by the two operations, with 17 deaths, or 8 per cent. The mean age of these patients was over 60 years.

And this is a result which, I need hardly say, has not hitherto been approached by any other mode of treating calculus in the adult. This subject, however, will be illustrated to its fullest extent in the succeeding lecture.

It ought to be added that the lithotomy cases above referred to were performed almost exclusively in the former half of the term; and most of them would have been submitted to lithotrity had they happened at a later period, and probably with a smaller mortality. For if we regard the latter half only, that is to say, the last 125 of these cases, but 4 lithotomies will be found among them; the remaining 121 were by lithotrity; and the total deaths were 6, or a mortality of only 5 per cent.

I have removed several stones of uric acid, and one of oxalate of lime, considerably upwards of an ounce in weight. The largest uric acid calculus I removed at a single sitting weighed $2\frac{3}{4}$ oz., and occupied me seventy minutes. The patient was seventy years of age, and made a capital recovery; No. 606 in the catalogue. He was a patient of Dr. Travers, of Kensington, who was present at the operation, and attended to him throughout assiduously. I cannot speak too highly of the results thus attained. Indeed, nothing need be added to the figures I have adduced above, which exceeded any expectation I could have previously formed as to the success of operating on men upwards of sixty years of age, with stones of all sizes.

In conclusion, I think we must admit that the operation of lithotrity at a single sitting bids fair to supersede lithotomy for the adult calculous patient in all cases except those in which the stone is of rare and exceptional size. An analysis of the experience of the two methods by British surgeons during the present century will occupy the concluding lecture, and will furnish data for the formation of a definite opinion.

LECTURE VI.

THE RESULTS ATTAINED BY LITHOTOMY AND LITHOTRITY IN GREAT BRITAIN DURING THE PRESENT CENTURY; WITH AN ANALYSIS OF MORE THAN 800 CASES BY THE AUTHOR, PRESENTED THEREWITH.

It may be in your recollection that at the preceding lecture we traced the gradual development of lithotrity, and observed the varying relations which, during its progress, it held with the old operation by the knife. We have seen that the partisans of the latter procedure, after essaying various new modifications of it, slowly yielded their ground, which was gradually won by the new method as it increased in safety and efficiency, and that the result of a very wide experience has at length led the profession to conclude that lithotrity offers the best mode of escaping from their trouble, for a very large proportion of all calculous patients. And now, almost for the first time, it may be said that there is no longer any question as to the comparative merits of the two operations; the relations between them being no longer those of rivalry, but entirely of a nature complementary the one to the other. Lithotrity is the rule; lithotomy the almost rare exception—and when employed, is so, because some condition exists which renders lithotrity undesirable or inapplicable. The time is fast approaching, if indeed it has not come, when a distinct limit can be traced as to the relative applicability of the two procedures; and a decision arrived at, which will command a more general assent, and will probably be longer final, than any doctrine which has been enunciated respecting this subject since the operation of crushing was invented. Before entering on the discussion of this important subject, there are two subordinate inquiries which it is desirable should be pursued. I shall make two statements which demand some serious consideration, and which at the first glance may perhaps not appear so necessary, or so important, as I think I shall show them to be.

They are demanded solely, as we shall see, by the conditions

of modern practice, which we have already seen have arisen step by step, and which have issued in the almost universal applicability of lithotrity to the cases of adult calculous patients.

The first consideration is, that it is essential to determine, and if possible to define, what is to be understood henceforward by the term, 'a stone in the bladder.'

The second is the fact that, in estimating the value of treatment for calculous cases, the result of a single operation for stone can no longer be regarded, as it invariably was until a few years ago, as a fact of the highest importance, and as synonymous, or almost so, with the history of a calculous case; since such an operation may now be only a single incident, and not always a very considerable one, which may be repeated, sometimes on several occasions, in the course of such a history.

The importance of these statements will appear as we proceed.

We will first consider what is in future to be regarded as a definition of the term 'stone in the bladder.'

When a calculus was removable only by lithotomy—a period, moreover, which was anterior to the discovery of anæsthesia—the magnitude of the operation almost invariably prevented the surgeon from proposing it, or the patient from accepting it, until painful symptoms had been endured for a considerable period of time, and the stone was at any rate no longer small. Indeed, among the operators of the eighteenth century, it was considered not always desirable to attack a stone when first discovered; but rather that, if small, it should, to use a term then in vogue, be allowed to 'ripen:' in other words, to increase in size somewhat before the operation was performed. Again, it was very rare to operate on the same individual twice. A man who had once passed through the ordeal of a cutting operation was, if he had the misfortune to form another stone, not lightly advised by a cautious surgeon to undergo a repetition of the process; and was himself naturally reluctant to submit to it. Now and then an individual was operated on twice; but it was a rare occurrence. One or two histories are on record of fortunate patients who survived a third operation; but such an event was one of the extremest rarity.[1]

[1] Among the 704 cases recorded by Crosse, as the experience of the Norwich Hospital up to 1830, only twelve patients were operated on a second time, seven of them being under twenty years of age. (*A Treatise on Urinary Calculus*, p. 164, by J. G. Crosse. London, 1835.)

The result of these conditions was, that a great number of calculous patients died of their malady, relieved, it is true, for a time by medicines, but not subjected to any operation. I am quite sure I am within the limits of truth if I say that, regarding the class of elderly calculous patients, probably not more than one in fifty during the last century was submitted to operation. I doubt if the proportion was so large as that. The stone, although present, was often not suspected to be so, much less was it sought for; and its symptoms were mostly attributed to 'strangury,' a term which formerly covered several forms of urinary disease, not then distinguished. If a search were made, it was often fruitless, because the instruments were faulty, and the experience, as well as the tact which comes from it, was small. In the country districts there were very few men who could or would undertake the operation; and the conditions of locomotion at the period referred to rendered a rough and tedious journey well-nigh impossible for most of the suffering patients. Hence it was that the itinerant lithotomist supplied a pressing want in times gone by; and was a welcome visitor in many a country district. Then the dread of the operation itself, and of its dangers, deterred a majority of those sufferers who were within reach of aid from invoking it. The result of these various circumstances was, that a very large proportion of calculous patients were children, who, unable themselves to exercise any will in the matter, and being known by their relatives to incur comparatively less risk than their seniors, were without difficulty placed under the care of the operator. The reports of Robert Smith, referred to in the preceding lecture, are extremely interesting and significant in relation to these facts.[1] I think the great contrast which exists between the surgical achievements of the present day, and those of the period named, is scarcely to be realised by those who have not come into some sort of contact, directly or indirectly, with the practice of surgery, metropolitan and provincial, before the period of anæsthetics.

You will see then, that in all the past experience of calculous disease, anterior to and terminating with the year 1830 or thereabout, an operation for the stone was necessarily a very important

[1] *Med.-Chir. Trans.* vol. xi. The centres of Norwich, Edinburgh, Dublin, Dundee, and Aberdeen were, after the metropolis, the chief localities in which skilled aid was to be obtained.

fact; and was almost invariably the culminating point of a long history of suffering in the individual affected. The event was looked forward to as demanding great courage on the part of an adult patient to confront, not only the torture of the operation, but the chance of a fatal result. Hence, a list of the several stone operations which a surgeon had performed was equally a list of all his stone patients and of their entire histories; and the number corresponded with the number of his cures and of his failures.

And when we come to analyse the work of the old masters, you will see how the remarks which have been made respecting the vast-importance to an adult patient of an operation are warranted from the fact that almost all their cases were those of children. And this, too, explains the large proportion of recoveries which some of their lithotomy records present. Indeed, compared with our experience of to-day, an operation for stone was rare indeed among elderly men—not that stone was less frequent then; there are some reasons for believing the reverse; but that, on grounds already referred to, it did not come to the operating table. Now, in order not to expend time unnecessarily, I shall adduce but one illustration of this fact, taking it from the figures of our great English master, Cheselden. The well-known record which he published at the end of his career amounted to 213 cases of operation, of which 135 were under 10 years of age, with 3 deaths; *only* 14 *were above* 50 *years of age, and of these* 6 *died.* By way of marking the contrast which the records of to-day furnish, the cabinet of my own calculi there contains the cases of 595 male patients of that age alone, out of a total of 812, or more than forty times Cheselden's number.

But the great fact of to-day which marks the difference between this age and the past is, that now we are able to remove a stone even of considerable size from the bladder of the elderly adult with a risk to life which, in most instances, is very small, and which is serious only in cases of an exceptional character. The consequence is, that a moderate sized calculus is generally disposed of at once as soon as it is discovered, because uncontrollable dread of a dangerous operation is no longer an occasion for delay. At the same time it is equally the aim of the surgeon and the interest of the patient that a calculus should be discovered as early as possible, in order that it should be removed when small. It follows further, and this is a matter of the highest importance,

that if the calculus recurs the operation is easily repeated, whether it be a new product of uric acid, or of oxalate of lime, which has recently descended from the kidneys, or a renewed accumulation of phosphates from decomposing urine in an incompetent bladder which has long been emptied by the catheter. In either case lithotrity is available time after time, if need be, to afford relief, and a patient's life, which formerly depended on the result of a single formidable cutting operation, is now indefinitely prolonged for many years on easy terms by an occasional recurrence to the lithotrite. There are now some patients whose bladders are periodically cleared of freshly-formed phosphatic concretions, with almost as much regularity, and with nearly as little risk, as other persons incur by periodical relief from a hydrocele. I repeat, therefore, the statement that the record of a single calculous operation and the history of a calculous patient are now very far from being synonymous terms. Sir Benjamin Brodie, you will remember, reported 115 operations by lithotrity. It was the first considerable British experience; but 'eight of these,' said he, 'occurred in one individual.' And we do not know how many or how few patients furnished those 115 cases, a fact which greatly reduces the value of his communication. Hence I desire to place on record the following deduction as most important in the interest of accuracy in reporting and in observing results, viz. that a computation of the results of lithotrity is not possible by the numerical record of cases only, and by the bare exhibition of a list of so-called 'cures,' and deaths; but that the entire record of the calculous patient's history—its commencement, the number of operations, the quantities of débris removed, and the incidents of the subsequent history, so far as they can be obtained—are essential in order to furnish evidence in regard of the treatment employed, and to render the case useful as a contribution to surgical experience. And it follows also that, in speaking of a 'stone'—which no longer necessarily means a considerable product of accretion during years, such as that for which a patient was formerly cut—a certain understanding ought to exist among surgeons in order to indicate some limit to the meaning of the word. At any rate, it is now necessary in all cases that the composition and weight should be recorded, while it might be convenient to apply the terms 'stone' or 'calculus' only to such aggregations of material as attain a certain amount of size or weight. I think, however, it will be

generally agreed that, when a bladder is found, for the first time, to contain a calculus, whether urate, oxalate, or phosphate, which is too large to be expelled by the natural efforts, the crushing and removal of it (together with others, if such be present), so as to empty the bladder, necessarily constitutes an 'operation for the stone,' whether it (or they) be large or small. If a small stone only is present, the patient is fortunate in having it detected, because it would inevitably have become larger had it not been discovered, and the operation is then attended with a corresponding increase of risk. As has just been intimated, calculi may be formed again in any case, and these fresh formations appear in two very different conditions. Some patients will produce, with considerable frequency, a small acid calculus, so that every two or three months or so, during several years, a small pisiform body, usually uric acid, drops into the bladder, and if too large to be expelled remains there. Thus a number may be collected, each increasing very slowly in size, long before the symptoms become severe and demand relief. Such a patient may most advantageously avail himself of lithotrity every two or three years during a considerable portion of adult life, the case of Brodie, before noticed, being a marked example. Nevertheless be it remarked, that in five cases out of six he may, by well-chosen diet, speedily overcome the tendency to produce superfluous uric acid, and cease to form these calculi. But there is another type of patient who rapidly forms calculus, more rapidly even than the preceding. I refer to the patient who passes all his urine by catheter and is the subject of phosphatic urine. In a certain proportion, happily small, of these cases, sometimes as the result of little sacculi in the coats of the bladder, a healthy acid condition of the urine is not attainable, and small phosphatic calculi are formed with surprising rapidity and frequency. I have had several patients under my care whose bladders require clearing by means of the lithotrite and aspirator as often as twice a year. On the very first occasion, perhaps, a phosphatic calculus of considerable size has been removed, and again, in two or three years, another, and these are fair examples of 'stone,' regarding the sense in which it has been customary formerly to employ the word. But at length the chronic condition, described above, is reached; smaller calculi are rapidly produced, and now the result of each operation has no right to be so regarded, if we maintain in future the idea hitherto associated with the term

'stone.' Hence I have in practice termed these small and recurring bodies 'concretions,' in order to draw a needful distinction between these and the large primary formations. I have removed at least 200 or 300 of these small bodies without placing them in my list of stone cases. But there is no recognised rule to this effect, and it is confessedly not easy to construct one. And I have long felt how open the door is to error unless one is careful to avoid misrepresentation in regard to this matter. That such small concretions have been made to do duty in augmenting the figures which represent cases of stone I have good reason to know. By way of suggesting a limit, I think that, after the first phosphatic calculus has been removed from a patient, no subsequent phosphatic formation of the kind described weighing less than about a drachm should be permitted to rank as a second stone, but should be described as a concretion.

It is strictly in accordance with the plan thus advocated that I have treated from the very first all the cases of my own, which are now exhibited in the cabinet before you. It consists entirely of my own cases, and of all those cases without exception. Each number in the catalogue, from No. 1 onwards, denotes, not a mere operation, but a separate individual, who has been operated on either by lithotomy or by lithotrity: so many numbers, so many individuals. To each number is added his name, age, and a record of the one or more operations he has submitted to, with the result; and as much of the subsequent history as, in a few cases, I have been able to obtain. I shall merely add now, that the number of individuals is 716, and that the total cases of operation, embracing both lithotomy and lithotrity, are 812 in number; and that I shall offer you an exhaustive analysis of the facts in their proper place towards the close of the lecture. But before doing so, I have to submit for your consideration some very interesting matter in connection with the chief statistical records which precede my own in date, for the purpose of estimating the results of operations for stone, not merely by lithotomy alone, but also during that transition period which intervened between what may be called the two epochs, respectively, of lithotomy and of lithotrity. For it will appear, if we recall the brief retrospective sketch given at the last lecture, of stone-operating during the present century, that its history is naturally divided into three chief stages.

I. There is the era of lithotomy pure and simple, when the knife was applied to cases of every description.

II. This was followed by an era in which, lithotrity having appeared, it was adopted for a certain proportion of patients for whom the crushing was believed to be better than the cutting operation, which latter, on the other hand, was preferred on certain grounds for other patients; the relative numerical proportions submitted to the two procedures differing in the practice of different operators, but approximating more or less to equal moieties of patients by each method.

III. There is the era which appears now to be established, in which lithotrity, considering the results already brought forward, may be regarded as applicable to all adult cases as the rule, the exceptions of any kind, besides the cases of children, being extremely few.

1. Now, as an example of the first period, or that of lithotomy pure and simple, I can scarcely adduce a more complete record, probably none more trustworthy, than that which exists in the archives of the Norfolk and Norwich Hospital. It was admirably presented by Crosse in his well-known work (a Jacksonian prize essay) of 1835; and the calculi themselves may be seen in the museum there at this day. During the first sixty years after the establishment of that hospital, where the best provincial experience in our country was to be found, 704 cases of all kinds and ages were operated on. The period referred to commenced about 1770, and ended about 1830.

Of the 704 cases,

35 were females, with two deaths.

343 were male cases below 20 years, with 27 deaths: a mortality of 1 in 13 cases, or 8 per cent.

326 were male adults, with 64 deaths: a mortality of ONE IN 5 CASES, OR 20 PER CENT.

Among these, there were only 75 males over sixty years of age, among whom the deaths were 22; or one death in every 3½ cases, or 30 per cent.[1]

I also made with great labour, just previous to the year 1860, and after communication with almost all the leading surgeons in the kingdom at that time, a collection of 1,827 hospital lithotomy operations, of which the records were carefully examined for the

[1] *Op. cit.* pp. 158–164.

purpose. They comprised the case-books of Birmingham, Cambridge, Guy's, Leeds, Leicester, Norwich, Oxford, St. Thomas's, and University College hospitals; being those in which I found the necessary data. Where the records had been imperfectly kept, the reports were not accepted. Briefly analysed, these cases present the following results:—Of the 1,827 operations, 1,028 were on patients aged from one to sixteen years inclusive; and the deaths were 68, or 1 in 15 cases. There were 528 cases between seventeen and fifty-eight years inclusive, with 86 deaths; or 1 in about 6 cases. There were 271 cases between 59 and 81 years inclusive, with 75 deaths; or one in about $3\frac{1}{2}$ cases.[1]

2. We now enter on a consideration of the transition period, which may be roughly regarded as commencing in this country about 1835, and ending between 1860 and 1870. The experience of two well-known operators will admirably illustrate the results which were attained during this epoch by the nearly equal division of adult male cases between lithotomy and lithotrity. I feel myself happy in being able to present to you, first, the exact and complete experience of my old friend Dr. Keith, of Aberdeen. He left it to me to utilise at such time and in such manner as I thought best. I have before casually referred to it in general terms, and I think I cannot now more worthily commemorate the work of that kind-hearted and excellent man, and most able surgeon, than to record it first fully here in our College. Keith operated chiefly between 1835 and 1868. He recorded all his facts with great care and attention to detail, his own manuscript notes being in my possession, and I have made the following analysis of them.

Dr. Keith operated on a total of 304 cases at all ages.

Of these 4 were females:

Lithotomy . .	2	No death.
Lithotrity . .	2	

23 were children:

Lithotomy .	19	One death.
Lithotrity .	4	

27 leaving 277 adult males.

Of these 277 *adult males*—

[1] *Lithotomy and Lithotrity.* By Sir Henry Thompson. 1st edit. London, 1863.

161 were by lithotomy, with 38 deaths: one case in $4\frac{1}{4}$, or 24 per cent.

116 were by lithotrity, with 7 deaths: one case in 17, or 6 per cent.

A total of 277 adult males, with 45 deaths: ONE CASE IN $6\frac{1}{2}$, OR 15 PER CENT.

It will be in the recollection of most of us, that in the year 1865, Sir William Fergusson, occupying the chair which I have now the honour to hold, presented the sum total of his experience to the College. His cases were rather fewer in number than those of the list just given, and they included a larger number of children.

SIR WILLIAM FERGUSSON operated on a total of 271 cases at all ages.

Of these, 52 were children, all lithotomy, with 2 deaths: one case in 26, or 4 per cent.;

leaving 219 adult cases.

Of these 219 *adult males* (comprising a few female cases, number unknown),—

110 were by lithotomy, with 33 deaths: one case in $3\frac{1}{3}$, or 30 per cent.

109 were by lithotrity, with 12 deaths: one case in 9, or 11 per cent.

A total of 219 adult males, with 45 deaths: or ONE CASE IN 5, OR 20 PER CENT.

3. We now enter on the third epoch, or that in which lithotrity is the manifest rule of practice for the adult, and lithotomy the occasionally necessary exception. And this may be illustrated by my own cabinet of calculi, now before you, which was commenced shortly before 1860. A small early portion of it may perhaps be regarded as almost belonging to the period just passed by; but inasmuch as, at the outset, I aimed at accomplishing as much as possible by lithotrity, it belongs in reality to the present epoch. In France, this principle had, in the hands of Civiale, long been the rule of practice; but unhappily he left no authentic record of it. Indeed, he never undertook the unremitting and patient labour which accurate written observations of every case entail. During late years he issued periodical memorials of his work, presenting some fifty or sixty cases at a time, with the results, i.e. whether cured or fatal, in many of them; but associated always with a considerable residuum of cases, adjourned, or

'awaiting further treatment,' and not further traced or accounted for; so that no epitome of his work was, or ever could be, presented. Indeed, there is no authentic record even of the total number of patients on whom he operated.

In this country lithotrity was, before 1860, as we have already seen, slowly becoming responsible for a large share of the work in the hands of the leading operators. In most parts of the kingdom, however, it was still employed only for exceptional cases. But I was strongly of opinion that it was not sufficiently appreciated in this country, and that it ought to be much more widely employed, and I urged this view persistently in my earliest writings, prior to 1860.[1] Accordingly, among my first 200 cases of adult males, only 48, or not quite one fourth, were submitted to lithotomy. The proportion of cutting operations then gradually diminished, henceforward, to about one case in seven or eight, rising in one recent year only (1878), when an unusual number of large calculi happened to come to me. But in the end of that year I commenced to employ lithotrity at a single sitting, doing so extensively and confidently at the commencement of 1879. Since that date I have performed 196 cases by this method solely, that is, during a term of five and a half years, and only 15 lithotomies—in all 211 cases, the mean age of the entire number being upwards of sixty years. But, taking my last 125 operations up to the present date, on adult calculous patients, only four have been treated by cutting: all the others, viz. 121, were cases of lithotrity at a single sitting; a proportion of 30 by crushing to 1 of cutting.

The total result of all my operations, which I have obtained from a careful adaptation of the two procedures to my cases,

[1] In that year I urged the general applicability of lithotrity, as a result of recognising the presence of calculus when small. In an article entitled 'On the Great Importance of early Diagnosis and Treatment for Stone in the Bladder,' I called attention to the fact that—

'The formation of large calculus in the bladder of the adult is preventible; because its presence may almost always be ascertained in an early stage, and because its destruction in that stage is an operation which, with a fair amount of skill, may generally be accomplished with certainty and with safety to the patient.'

'The first indication—viz., to prevent the formation of a stone of moderate or average size—is ensured by an intelligent appreciation of the early signs which it produces; in other words, by a diagnosis of its existence while it is yet small. The second indication may generally be fulfilled by crushing it in that stage.' Three cases thus found and operated on by lithotrity, follow in illustration.—*The Lancet*, January 21, 1860.

during a period which may be almost accurately estimated as the last twenty-five years, is as follows.

I have performed 812 operations on cases of all ages. The number of individuals on whom these operations have been performed is 716; some of the lithotrity patients having, of course, been operated on more than once, as will be stated in detail hereafter.

Of these cases, 13 are adult females: 10 by lithotomy (one chiefly by dilatation), with one death; and 3 by lithotrity.

15 are children: 12 by lithotomy, with one death; and 3 by lithotrity.

Then there were two operations (one a suprapubic lithotomy) for foreign bodies recently introduced.

There remain 782 cases of operation on the adult male.

Of these 782 adult male cases:

110, or one-seventh of the entire number, were by lithotomy, with 39 deaths: one case in almost 3, or 35 per cent.

672 were by lithotrity, with 43 deaths: one case in $15\frac{1}{2}$, or under $6\frac{1}{2}$ per cent.

A total of 782 adult male cases, with 82 deaths: ONE CASE IN $9\frac{1}{2}$, OR $10\frac{1}{2}$ PER CENT.

It is worthy of remark, that among the adult males no fewer than 595 individuals were upwards of fifty years of age at the date of operation.

I may now add, that of the 716 individuals, 61 were operated on a second time, at various intervals, when a second stone of considerable size was developed; evidence existing, in long continued absence of symptoms after the first operation, that the calculus was undoubtedly a new formation. Nine patients were operated on a third time; three patients a fourth time; and two as many as five times.

It is worthy of note that each of the last named, the history of whose operations extends over a period of from twelve to fifteen years, are now living in comfort: one a gentleman at Paris, the other a merchant in a midland county. The latter has passed more uric acid than any man I have seen, unless the patient No. 62 in the series, from whom I removed four large calculi, at four different periods in the course of about sixteen years. In both

cases, each succeeding calculus of large size was a fresh deposit of uric acid, which each still continued to excrete largely, and not the mere accumulation of phosphates often so abundantly produced in a bladder incapable of emptying itself. The calculi in these two very exceptional cases are placed by themselves for inspection.

In analysing the results of the preceding table, it may be unnecessary to say that in the circumstances above described it is not possible to make any comparison as to the relative value of lithotomy and lithotrity. The position of the two operations towards each other is no longer one to invite comparison, but is that of complementary relation. Each accomplishes a part for which the other is less competent; nor, for the same reason, is it any longer possible to compare the results obtained by different operators in regard of employing either method, unless each operator is guided by the same principle in applying them, for it is obvious that the surgeon who adopts lithotrity for the great majority of his cases, that is, for all but those which are the most difficult, necessarily obtains for his lithotomy only an unpromising residuum of exceptionally bad patients. And it is not to be forgotten, as Keith has remarked, that when an operator obtains reputation, he attracts the worst cases, and is compelled to deal with some of the most unhappy examples of the disease, unless he refuses such applicants, a course which I have never pursued. During my entire experience I have refused operation to six patients only, and in each instance because I thought the proceeding was either entirely hopeless, or impossible of performance. In one case I regretted my decision, for the patient lived long and suffered very severely. Hence the lithotomy of an operator who employs the knife only for the worst case in eight or ten, cannot be compared with that of the surgeon who applies it to a large proportion of his cases, and therefore to a considerable number of healthy and promising patients with not very large stones, such as I have always treated by lithotrity.

It is the sum total of result obtained by employing the two procedures which is to be regarded as the measure of the surgeon's success. And I think I may say that a list of 782 cases in male adults, the mean of whose united ages exceeds sixty years, with 82 deaths, or 1 in 9½ cases, is a result which will be held to justify the selection and adaptation of the method to the case, which has

been adopted throughout this series. I venture to say that it is a result which has not, certainly to my knowledge, hitherto been realised.

Thus we saw that Cheselden, with patients of this age, lost 6 in 14, or 1 death in 2·3 cases; that the Norwich rate for elderly adults was 1 death in 3½ cases; that Keith advanced to a rate of 1 death in 6½ of his adults, by both methods; that Fergusson, who had many bad cases sent him to King's College Hospital, lost 1 in 5 by both methods. But while the sum total of my whole work has been 1 death in 9½, the result of the last five years, since I have adopted the one-sitting operation, has been still better—namely, 1 death in 12½ cases (211 elderly adults with 17 deaths), or 8 per cent. Finally, if I take my very last 125 cases up to this date, and already referred to as containing only 4 cases of lithotomy, I have to report 6 deaths only (of which 2 were from the cutting operation), making only 1 death in 20, or a rate of less than 5 per cent.

And now I shall ask you to observe further, that the clinical notes made at the time in every case are presented to you here: each patient with his own proper name, together with the name of the attending medical man whom I met in consultation in each instance; and, finally, the calculus of almost every patient is presented also. In every single case, therefore, in the whole collection, I am responsible for every fact stated, and offer with it absolute guarantees of its accuracy. No labour has been spared to pursue this system throughout, and my satisfaction is complete at being thus enabled to offer to the College, if they will do me the honour of accepting it, a faithful record of one man's practice during five-and-twenty years, as complete and as elaborately reported as it has been possible to make it.

There is an important fact to which I now desire to call attention, and it appears for the first time in the figures which I have had the honour to lay before you. In all records of past practice it has been a doctrine universally accepted, that the very large majority of calculous patients is formed by children. In all tables presenting the experience of hospitals, the patients below puberty furnished half the entire number. Some twenty years ago I took it upon myself to express a conviction that stone was more prevalent during the latter third of life than at any other period, and there is now no doubt that this view is correct.

The number quoted of 595 cases over fifty years of age out of a total of 812 cases, suffices, I think, to determine the question. The fact is, that the presence of a small acid stone in the bladder of patients between fifty-five and seventy-five years of age is a far commoner incident than anyone thirty years ago believed it to be. To myself, the recognition of it gradually dawned as a discovery. Surgeons generally looked for a group of well-marked and painful symptoms as the almost invariable accompaniment of stone, and had no idea how tolerant the bladder sometimes is, at this period of life, of the presence of a small calculus. Possibly from diminished sensibility in the bladder of elderly men, partly from the frequency with which only a moderately enlarged prostate, as it would appear, may mask the symptoms, or even hinder the occurrence of some of them, many a man may, and does, carry a uric acid calculus for three or four years, with little or no inconvenience, except that slightly increased frequency of micturition, occasional uneasiness, and a trace of blood after unusual exercise, which it has been common with many to regard almost as the natural infirmities of age. To my mind, these slight signs are highly significant, and I may now say that the watchful observation of them in some hundreds of cases has enabled me very often to detect an unsuspected calculus in its early stage, and hence to remove it safely and efficiently. It is no small matter to save a sexagenarian patient from the risks of operation for a calculus which may become large, and which then demands a corresponding operation for its removal. The early discovery of stone also enables the surgeon to deal with another and distinct condition, which in my opinion is not less important to his patient than the successful operation, namely, inasmuch as it affords him an early opportunity of placing the patient on a course of habits and regimen which will certainly suffice in almost all instances to arrest the formation of superabundant uric acid, and so prevent the subsequent formation of more stone. It is impossible to exaggerate the value and importance of this part of the treatment; this arrest, at a comparatively early stage, of a tendency which, when the calculus is undiscovered, goes on unchecked, and is strengthened by time. Many of those patients whom I operated on at from sixty to sixty-five years of age, and who then adopted a thorough change of regimen and diet, are now living at seventy to seventy-five, and upwards, without

return, enjoying better health than before, as may be seen by reference to the records which accompany this collection.

The symptoms which I regard as the most distinctive in these elderly patients, whose symptoms are so slight, and therefore so important to be observed, are as follow: Slight pricking or smarting at and near the end of the penis, often but not invariably felt during and after the close of micturition. Increased frequency of micturition, mainly when the patient's habits are active. It is therefore less felt at night, and is more manifest in the day, and especially during exercise; but if he leads a very quiet life, the symptom is very slightly noticed. There is a slight appearance of florid blood in the urine after unusual exertion, especially in a carriage on a rough road, or in the saddle.[1] The urine is probably clear and fully acid, perhaps frequently depositing urates. With these signs and sensations in an otherwise healthy elderly man, the presence of calculus is extremely probable: no severe pain may even have been experienced, nor any symptom of a calculus descending from the kidney. But if a patient exhibiting these signs has also passed one or more small calculi, then it is almost certain that he has also one now present in the bladder. No doubt it is very easy to miss a small calculus by clumsy or by imperfect sounding; and, under the conditions described, it is much more likely, should none be discovered, that the surgeon has missed it, than that the stone should not be there. In that faith I have found at least 100 small and early cases; and during the former part of my career most of them were discovered, contrary to all expectation, founded on teaching of doctrines at that time current. There are two large trays in that cabinet of small stones, mostly uric acid, of which sometimes I hear it remarked, with some trace of subdued contempt, that they certainly are not large specimens. I am very proud of those small stones. I found them when they were not suspected in men who, for the most part, had been sounded, and believed to be free from their presence. And, finding them thus early, and disposing of them at once, I saved those patients from the unhappy fate of slowly developing, with more or less of pain and trouble, large calculi, which

[1] Of the sudden stopping of the stream, invariably named in books as a symptom of stone, I am almost ignorant in practice. I do not hesitate to say it has no bearing whatever on the question of the presence or absence of stone, appearing only in a few exceptional cases.

might ultimately cost a valued life. Whereas, in the whole of those small calculi, a hundred in number, but one death followed the operation. So much for the importance of discovering the stone in its early stage.

One question remains for final consideration here: Is lithotrity to be regarded in future as the sole method of dealing with all calculous cases? or are there any which render a resort to the knife necessary, or preferable? The cases of children are those which naturally claim first to be considered in response to this inquiry. For a large portion of them lithotomy at present offers the simplest and safest solution of the problem. The small calibre of the urethra and the delicacy of its walls render the use of large instruments impossible. When the calculus is small it can be crushed and removed, and in this way I have dealt successfully with three cases out of fifteen, the small proportion which has fallen to my lot.

In regard to the adult the answer must take a less simple form.

With very few exceptions, the only condition rendering a case not amenable to lithotrity is the size of the stone. It is difficult to say what shall be the size which, together with hardness, shall be accepted as determining the nature of the operation to be selected. Indeed, in the nature of things, there can be no hard and fast line drawn which shall be made applicable to all cases. Even the experience, and other personal qualifications of the surgeon himself must tell for something, in certain circumstances, in deciding this question. Then, again, the stone must always be regarded in relation to the organs of the patient. Is the urethra capacious, since this quality varies in different individuals? Are the bladder and kidneys fairly healthy? On the other hand, there may be some organic stricture of the urethra present, a condition which I have very rarely held necessary to contraindicate lithotrity, but only to render dilatation in some form necessary, and to restrict somewhat the power of manipulating so easily and rapidly as usual. In presence of an unusually large stone it might make lithotomy preferable. Prostatic obstruction, greatly developed, does not generally offer a very formidable obstacle, but it may demand modifications of the procedure; notably that which I adopted in one case, already referred to, of making an opening in the perineum to drain the bladder after lithotrity, so as to save frequently repeated catheterism.

The question now to be considered is: what course is the best to follow in those few and exceptional cases which may be admitted as occasionally presenting themselves, for which lithotrity, even with our present power, appears not to suffice. I have cited a case in which a single hard uric acid calculus weighing nearly three ounces was safely and satisfactorily crushed by me in a man of seventy with excellent result. Granted that this example represents about the limit of what it may be hoped to attain safely by lithotrity, there may still be smaller calculi than this for which circumstances may demand the knife, and there may also be larger calculi which it is possible to remove by crushing. But, supposing this to be a fair average maximum limit in most hands to the achievements of the latter procedure, let us inquire whether a practicable method is within our reach for the remainder.

I will commence by saying that there is a growing expression of dissatisfaction among surgeons generally with the lateral operation for stones of unusually large size. I have for some time fully shared in that feeling. No incisions can be made in the region which belongs to that operation through which a calculus of three ounces or more can be extracted. Laceration, either avowedly made by instruments, or but half concealed under the name of gradual distension, invariably takes place, and that affecting very important structures, often to a large extent. Hence it is that the suprapubic operation has always invited consideration when the stone is exceptionally large; but the conditions sometimes met with, especially in corpulent subjects, have often presented peculiar difficulties and dangers, which indicated that, if Scylla has been avoided above, Charybdis appears to be equally dangerous below. A modification of the operation, however, has recently taken place—if not originated, at least first executed, by Professor Petersen, of Kiel, and described by him in 1880, which gives a new and improved position to the high operation.[1] The improvement suggested consists in ensuring, to a degree not before attained, the raising of the bladder above the pubic symphysis, and the steadying it in that position during the operation. These objects are thus attained. The patient, lying on his back, and

[1] A Lecture by Professor Ferdinand Petersen, Director of the University Polyclinic at Kiel, delivered at Berlin, at the Ninth Congress of the German Association of Surgery, April 7, 1880.

under the influence of an anæsthetic, the bladder is first distended with a weak solution of boracic acid, in quantity from twelve to sixteen ounces if possible, which must depend on the condition of the organ. The penis is then firmly tied: nothing is better than an india-rubber tube for the purpose. To effect the distension, Professor Dittel, of Vienna, prefers air, for which he assigns his reason.[1] Then a pear-shaped bag of india-rubber, tolerably stout, so as to retain that form, and capable of holding at least sixteen ounces of fluid, is folded longitudinally and introduced into the rectum. By the tube which forms its apex, and is supplied with a stopcock, water is forced in so as fully to distend the bag *in situ*. The outline of the bladder, unless unusually contracted, will now be traced above the pubic symphysis. The usual vertical incision is made, and dissection carried down to the bladder, with the usual precautions with which we are familiar. The after treatment varies in different hands. Guyon, of Hôpital Neckar, who has published an interesting report of eight cases of Petersen's method, prefers to make free outlet for the urine from the wound by means of two india-rubber tubes,[2] Petersen himself closing the wound accurately with a single drain-tube at the lower angle. Perrier, of St. Antoine,[3] in Paris, has thus performed it twice; while Dittel, of Vienna, places a drain-tube in the wound, and a catheter in the bladder through the urethra.

I have operated by the high operation twice only, and that before the introduction of the new method. Since that time I have met with no case which I have not been able to deal with satisfactorily by lithotrity at a single sitting, of which several examples are placed before you—the calculi weighing from one to nearly

[1] A paper on the subject which appeared in Dr. Wittelshofer's *Wiener Medizinische Wochenschrift* (No. 3, 1884). Milliot's researches on the dead body in 1875 for observing the effect produced by distending the rectum on the position of the bladder and peritoneum, is said to have given rise to the idea which Petersen utilised in practice.

The subject, however, was elaborately studied by Dr. J. G. Garson, Anatomical Assistant at the Royal College of Surgeons here, soon after this time. He distended the rectum by an india-rubber bag, then froze the body and made various sections employing three separate bodies for the purpose, to show the results of distension on the several organs, especially in relation to the peritoneum. His paper, illustrated by plates showing sections, was published in the *Edinburgh Medical Journal*, October 1878.

[2] *Contributions cliniques à l'étude de la Taille Hypogastrique*, par J. C. F. Guyon. *Annales des Maladies des Organes Génito-urinaires*, Paris, 1883.

[3] *Bulletin de la Soc. de Chirurgie*, Paris, 1881, p. 807.

three ounces. The next case which offers for which the knife is required, I shall almost certainly submit to the high operation, with Petersen's modification. And the only reason why I have not yet performed it is, that I have easily and successfully employed lithotrity in cases precisely similar to those for which the French surgeons are at present adopting Petersen's procedure.

From the facts which I have laid before you, especially those which the last three years have enabled me to record, I think it may be inferred that the High Operation can very rarely indeed be necessary for stones below two ounces in weight, although our French brethren have performed it several times for such comparatively small formations. I cherish a steady confidence in the capability of the crushing operation, and shall make my final statement here the expression of a strong opinion that in the great majority of cases such calculi can be removed by lithotrity with less risk to the patient's life than by any cutting operation whatever.

NOTE.—Within a week after the delivery of this lecture, a man aged 36, formerly under the care of Dr. William Roberts, of Manchester, who had observed a large quantity of cystine in his urine, came to me with severe symptoms of calculus. Finding a large stone, I determined to perform the high operation, and did so on July 2, 1884. Having injected the bladder and rectum, I found the former steadily supported above the level of the pubic symphysis, and reached it, meeting with very little loss of blood and without tying a vessel. I easily removed an oval calculus, weighing nearly three ounces, a fine specimen of cystine throughout. He made a slow but sound recovery, and returned home with the wound healed about the middle of August.

The drainage gave no difficulty, and was effected by means of a catheter in the urethra, and a stout drainage tube in the wound; both removed before the sixth day.

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